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The investigation examined the role of physical activity programs in the modification of the motor, intellectual, social, and emotional development of educable mentally retarded children and minimally brain injured children. Forty nine classes of children (275 educable mentally retarded and 206 minimally brain injured) participated in 20 weeks of instructional programs. Classes were randomly assigned to one of four treatments: two were physical education programs (one individually oriented, the other group oriented); one was an art program (Hawthorne effect); the fourth, a control (usual program). A battery of 32 tests was administered prior to and at the end of the experiment. Children in the special experimental programs elicited greater positive changes in their motor, intellectual, and emotional behavior than those in the control program. Of the special programs, the physical education programs were superior in modifying motor performance, the art program in altering emotional behavior, and neither was superior in modifying intellectual behavior. The individually oriented physical education program elicited greater gains than the group oriented program in measures of motor, intellectual, and emotional behavior. Positive behavior changes occurred more frequently in the older than younger, more often in the brain injured than the retarded, and more frequently in the boys than the girls. (Author)

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G. LAWRENCE RARICK
GEOFFREY D. BROADHEAD

Department of Physical Education
University of Wisconsin
Madison, Wisconsin
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G. LAWRENCE RARICK
GEOFFREY D. BROADHEAD

DEPARTMENT OF PHYSICAL EDUCATION
UNIVERSITY OF WISCONSIN
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TABLE OF CONTENTS

Chapter		Page
	SUMMARY	1
ONE	BACKGROUND AND PURPOSES OF THE INVESTIGATION	3
	Introduction	3
	Purpose and General Plan of the Study	4
	Scope of the Investigation	5
	Review of Literature	5
	Physical Education for the Educable Retardate	5
	Physical Education for the Trainable Retardate	10
	Physical Education for the Minimally Brain Injured	10
TWO	PROCEDURES	13
	The Research Design	13
	The Subjects and Their Assignment to Treatments	14
	Treatment of the Data	15
	Assessing the Parameters of Behavior	20
	Introduction	20
	Motor Performance	21
	Flexed Arm Hang	21
	Sit-Ups	21
	Shuttle Run	22
	Standing Broad Jump	22
	50-Yard Dash	22
	Softball Throw	22
	300-Yard Run	23
	The Reliability of the Test Items	23
	Test Administration	23
	Strength Testing	24
	Description of the Tests	24
	The Reliability and Validity of the Tests	25
	The Test Administration	25
	Intellectual Behavior	25
	The Bender Motor Gestalt Test	25
	Description of the Test	25
	The Reliability and Validity of the Test	26
	Test Administration and Protocol Interpretation	29
	The Peabody Picture Vocabulary Test	29
	Test Description	29
	The Reliability and Validity of the Test	30
	The Administration and Scoring of the Test	32
	Emotional Behavior	32
	The Personality Questionnaires	32
	Test Description	32
	Reliability and Validity	34
	The Administration and Scoring of the Tests	34
	The Emotional Indicators	34
	A Test Description	34
	Test Administration and Protocol Interpretation	37

Chapter
TWO
(Cont.)

Page

Social Behavior 37
Sociometry 37
A Description of the Test 37
The Reliability and Validity of the Test 38
Test Administration and Scoring 40
Cowell Social Behavior Trend Index 40
Description 40
The Reliability and Validity of the Test 40
The Administration and Scoring of the Test 42

Additional Data Collected

Data from Individual Record Files 42
Date of Birth 42
Intelligence Quotient 42
Height 42
Weight 42
In-Service Training of Teachers 43
The Teaching Environment 45
Physical Education Programs 45
The Art Program 45
The Experimental Programs 46
Introduction 46
Rationale for the Experimental Treatments 47
Individualized Physical Education Program 48
Aims of the Program 48
Program Description 49
Blocks of Work 50
Introduction 50
Program Description 50
Group Oriented Physical Education Program 52
Aims of the Program 52
Program Description 52
Blocks of Work 53
Introduction 53
Program Description 53
Art Program 55
Aims of the Project 55
Program Description 55
Blocks of Work 56
Introduction 56
Description 56
Usual Classroom Instructional Program 56
Other Teaching Strategies 56
Discussion 56
Interior Teaching Suggestions 57
Demonstration and Child Observation 59
Equipment Used in the Experimental Treatments 60
Introduction 60
The Physical Education Programs 60
The Art Program 60
Control of the Environment 61
The Teaching Environment 61
The Testing Environment 61

Chapter		Page
THREE	THE EFFECTS OF THE EXPERIMENTAL TREATMENTS	62
	Introduction	62
	Modification in Motor Performance	68
	Introduction	68
	The Main Effect of Program	68
	Intellectual Effect of Age x Program	75
	Main Effect of Disability	82
	Discussion	85
	Modification in Intellectual Behavior	91
	Introduction	91
	Main Effect of Program	91
	Main Effect of Chronological Age	98
	Main Effect of Disability	98
	Discussion	102
	Modification in Emotional Behavior	107
	Introduction	107
	Results of the Analyses for the Younger Children	108
	Main Effect of Program	108
	Interaction Effect of Disability x Program	111
	Interaction Effect of Disability x Sex x Program	120
	Main Effect of Disability	126
	Main Effect of Sex	126
	The Characteristics of the Older Children	126
	Interation Effect of Disability x Program	126
	Discussion	135
	General Discussion of the Findings	139
FOUR	SUMMARY AND CONCLUSIONS	144
	Summary	144
	Conclusions	146
	BIBLIOGRAPHY	147
	APPENDICES	159
	ABSTRACT	194

LIST OF TABLES

Table		Page
1.	NUMBER OF CLASSES BY DISABILITY AND AGE LEVEL, ACCORDING TO SCHOOL DISTRICT	14
2.	THE NUMBER OF CHILDREN WHO COMPLETED THE PROGRAMS: A DISTRIBUTION ACCORDING TO DISABILITY AND TREATMENT	16
3.	ASSIGNED WEIGHTS FOR THREE PLANNED COMPARISONS	20
4.	BENDER MOTOR GESTALT TEST: SCORING SHEET	28
5.	THE LIST OF MEASURED PERSONALITY TRAITS USED TO MEASURE THE EMOTIONAL BEHAVIOR OF THE CHILDREN.	33
6.	RELIABILITY COEFFICIENTS OF THE CHILDREN'S PERSONALITY QUESTIONNAIRE	35
7.	CONCEPT VALIDITY COEFFICIENTS OF THE CHILDREN's PERSONALITY QUESTIOONAIRE	36
8.	COWELL SOCIAL BEHAVIOR TREND INDEX: FORM A	41
9.	NULL HYPOTHESES TESTED: THE MOTOR, STRENGTH, INTELLECTUAL, AND SOCIAL PARAMETERS OF BEHAVIOR	63
10.	NULL HYPOTHESES TESTED: THE EMOTIONAL PARAMETER OF BEHAVIOR	64
11.	THE RESULTS OF THE HYPOTHESIS TESTING: THE MOTOR, STRENGTH, INTELLECTUAL, AND SOCIAL PARAMETERS OF BEHAVIOR	65
12.	THE RESULTS OF THE HYPOTHESIS TESTING: THE EMOTIONAL PARAMETER OF BEHAVIOR	66
13.	MOTOR PERFORMANCE: MAIN EFFECT OF PROGRAM	70
14.	PLANNED COMPARISON FOR MOTOR PERFORMANCE TESTS: MAIN EFFECT OF PROGRAM - HYPOTHESIS ONE	71
15.	PLANNED COMPARISON FOR MOTOR PERFORMANCE TESTS: MAIN EFFECT OF PROGRAM - HYPOTHESIS TWO	72

16. PLANNED COMPARISON FOR MOTOR PERFORMANCE TESTS: MAIN EFFECT OF PROGRAM - HYPOTHESIS THREE 73

17. MOTOR PERFORMANCE: INTERACTION EFFECT OF AGE X PROGRAM 76

18. PLANNED COMPARISON FOR MOTOR PERFORMANCE TESTS: INTERACTION EFFECT OF AGE X PROGRAM - HYPOTHESIS ONE 77

19. PLANNED COMPARISON FOR MOTOR PERFORMANCE TESTS: INTERACTION EFFECT OF AGE X PROGRAM - HYPOTHESIS TWO 78

20. PLANNED COMPARISON FOR MOTOR PERFORMANCE TESTS: INTERACTION EFFECT OF AGE X PROGRAM - HYPOTHESIS THREE 79

21. MOTOR PERFORMANCE: MAIN EFFECT OF DISABILITY 83

22. INTELLECTUAL BEHAVIOR: MAIN EFFECT OF PROGRAM 92

23. PLANNED COMPARISON FOR INTELLECTUAL TEST ITEMS: MAIN EFFECT OF PROGRAM - HYPOTHESES ONE 95

24. PLANNED COMPARISON FOR INTELLECTUAL TEST ITESM: MAIN EFFECT OF PROGRAM - HYPOTHESIS TWO 96

25. PLANNED COMPARISON FOR INTELLECTUAL TEST ITEMS: MAIN EFFECT OF PROGRAM - HYPOTHESIS THREE 97

26. INTELLECTUAL BEHAVIOR: MAIN EFFECT OF AGE 99

27. INTELLECTUAL BEHAVIOR: MAIN EFFECT OF DISABILITY 101

28. EMOTIONAL BEHAVIOR (YOUNGER): MAIN EFFECT OF PROGRAM 109

29. PLANNED COMPARISON FOR EMOTIONAL TEST ITEMS (YOUNGER): MAIN EFFECT OF PROGRAM - HYPOTHESIS ONE 110

30. PLANNED COMPARISON FOR EMOTIONAL TEST ITEMS (YOUNGER): MAIN EFFECT OF PROGRAM - HYPOTHESIS TWO 113

31. PLANNED COMPARISON FOR EMOTIONAL TEST ITEMS (YOUNGER): MAIN EFFECT OF PROGRAM - HYPOTHESIS THREE 114

32. EMOTIONAL BEHAVIOR (YOUNGER): INTERACTION EFFECT OF DISABILITY X PROGRAM 115

33. PLANNED COMPARISON FOR EMOTIONAL TEST ITEMS (YOUNGER): INTERACTION EFFECT OF DISABILITY X PROGRAM - HYPOTHESIS ONE 116

34. PLANNED COMPARISON FOR EMOTIONAL TEST ITEMS (YOUNGER): INTERACTION EFFECT OF DISABILITY X PROGRAM - HYPOTHESIS TWO 117

35. PLANNED COMPARISON FOR EMOTIONAL TEST ITEMS (YOUNGER): INTERACTION EFFECT OF DISABILITY X PROGRAM - HYPOTHESIS THREE 118

36. EMOTIONAL BEHAVIOR (YOUNGER): INTERACTION EFFECT OF DISABILITY X SEX X PROGRAM 121

37. PLANNED COMPARISON FOR EMOTIONAL TEST ITEMS (YOUNGER): INTERACTION EFFECT OF DISABILITY X SEX X PROGRAM - HYPOTHESIS ONE 122

38. PLANNED COMPARISON FOR EMOTIONAL TEST ITEMS (YOUNGER): INTERACTION EFFECT OF DISABILITY X SEX X PROGRAM - HYPOTHESIS TWO 123

39. PLANNED COMPARISON FOR EMOTIONAL TEST ITEMS (YOUNGER): INTERACTION EFFECT OF DISABILITY X SEX X PROGRAM - HYPOTHESIS THREE 124

40. EMOTIONAL BEHAVIOR (YOUNGER): MAIN EFFECT OF DISABILITY 127

41. EMOTIONAL BEHAVIOR (YOUNGER): MAIN EFFECT OF SEX 129

42. EMOTIONAL BEHAVIOR (OLDER): INTERACTION EFFECT OF DISABILITY X PROGRAM 131

43. PLANNED COMPARISON FOR EMOTIONAL TEST ITEMS (OLDER): INTERACTION EFFECT OF DISABILITY X PROGRAM - HYPOTHESIS ONE 132

44. PLANNED COMPARISON FOR EMOTIONAL TEST ITEMS (OLDER): INTERACTION EFFECT OF DISABILITY X PROGRAM - HYPOTHESIS TWO 133

45. PLANNED COMPARISON FOR EMOTIONAL TEST ITEMS (OLDER): INTERACTION EFFECT OF DISABILITY X PROGRAM - HYPOTHESIS THREE 134

LIST OF APPENDICES

Appendix Page

A INDIVIDUALIZED PHYSICAL EDUCATION PROGRAM - Examples of Work Completed 160

B GROUP ORIENTED PHYSICAL EDUCATION PROGRAM - Examples of Work Completed 166

C THE ART PROGRAM - Examples of Work Completed 179

LIST OF FIGURES

Figure		Page
1.	THE RESEARCH DESIGN: Disability X Age X Sex X Program (with number of classes)	17
2.	THE GEOGRAPHICAL LOCATION OF THE SCHOOL DISTRICTS, AND THE SITES OF THE SCHOOLS IN WHICH WERE PARTICIPATING CLASSES	18
3.	BENDER MOTOR GESTALT TEST: TEST CARDS	27
4.	PEABODY PICTURE VOCABULARY TEST: A FICTITIOUS TEST PLATE	31
5.	MOTOR PERFORMANCE: Main Effect of Program for the Ball Throw, Broad Jump, Sit-Ups, and Arm Hang	74
6.	MOTOR PERFORMANCE: Interaction Effect of Age x Program, for the Sit-Ups and Broad Jump	80
7.	MOTOR PERFORMANCE: Interaction Effect of Age x Program, for the Arm Hang and Ball Throw	81
8.	MOTOR PERFORMANCE: Main Effect of Disability for the Ball Throw, Broad Jump, Sit-Ups, and Arm Hang	84
9.	MEAN PRE AND POST TEST BROAD JUMP SCORES by Treatment according to Disability, Age, and Sex	87
10.	MEAN PRE AND POST ARM HANG SCORES, by Treatment According to Disability, Age, and Sex	88
11.	MEAN PRE AND POST SIT-UP SCORES, by Treatment according to Disability, Age and Sex	89
12.	MEAN PRE AND POST BALL THROW SCORES, by Treatment according to Disability, Age, and Sex	90
13.	INTELLECTUAL BEHAVIOR: Main Effects of Program, for the Peabody and Bender Tests	94

14. INTELLECTUAL BEHAVIOR: Main Effect of Age, for the Peabody and Bender Tests 100

15. INTELLECTUAL BEHAVIOR: Main Effect of Disability, for the Peabody and Bender Tests 103

16. MEAN PRE AND POST PEABODY TEST SCORES, by Treatment according to Disability, Age, and Sex 105

17. MEAN PRE AND POST BENDER TEST SCORES by Treatment according to Disability, Age, and Sex 106

18. EMOTIONAL BEHAVIOR (Younger): Main Effect of Program, for Personality Factors Q_4 (Tension, and B (Intelligence) 112

19. EMOTIONAL BEHAVIOR (Younger): Interaction Effect of Disability x Program, for Personality Factors Q_4 (Tension), and B (Intelligence) 119

20. EMOTIONAL BEHAVIOR (Younger): Interaction Effect of Disability x Sex x Program, for Personality Factors Q_4 (Tension), and B(Intelligence) 125

21. EMOTIONAL BEHAVIOR (Younger): Main Effect of Disability, for Personality Factors Q_4 (Tension), and B (Intelligence) 128

22. EMOTIONAL BEHAVIOR (Younger); Main Effect of Sex, for Personality Factors Q_4 (Tension), and B (Intelligence) 130

23. MEAN PRE AND POST TEST SCORES FOR PERSONALITY FACTOR B(Intelligence), by Treatment according to Disability, Age, and Sex 137

24. MEAN PRE AND POST TEST SCORES FOR PERSONALITY FACTOR Q_4 (Tension), by Treatment according to Disability, Age, and Sex 138

SUMMARY

This investigation was designed to determine the role of educational physical activity programs in the modification of the motor, intellectual, social, and emotional behavior of educable mentally retarded children and minimally brain injured children of elementary school age. More specifically, answers were sought to the following questions:

1. What are the differential effects on the motor, intellectual, social and emotional development of children who follow a special experimental program (one of two types of physical activity programs or an art program) compared with those who pursue their usual classroom instructional program?

2. Are there differences in the motor, intellectual, social, and emotional development of children who follow special physical education programs, compared with those included in an art program?

3. What differences are there in the motor, intellectual, social, and emotional development of children in an individual physical education program compared with those in a group-oriented physical education program?

In answering the above questions, due consideration was given to the effects of disability, chronological age and sex.

Forty-nine classes of educable mentally retarded children (N=275), and minimally brain injured children (N=206) from the Pasadena, Galena Park, and Deer Park Independent School Districts of Harris County, Texas participated in twenty weeks of instructional programs. Classes were randomly assigned by disability and age to one of four treatments.

Of the four treatments, two involved special educational physical activity programs, the one being individually oriented, the other group oriented. A third treatment was an art program, included to assess the Hawthorne effect. The fourth treatment served as an experimental control, the usual instructional program.

All programs were taught by the classroom teacher for approximately thirty-five minutes every school day for a period of twenty weeks. The teachers were prepared for the teaching and testing programs through in-service meetings. The research was supervised throughout by the project assistant, a fully qualified physical educator.

A total of 32 tests, selected to measure the four parameters of behavior, was administered to the children prior to and at the conclusion of the experiment.

The treatment of the data was by multivariate analysis of covariance. Where significant F values occurred for main effects or interaction effects the adjusted means were examined. Direct answers to the questions posed by the research were obtained by using pre-planned orthogonal comparisons.

The following summarizes the findings of the research:

1. Children who participated in one of the three specially planned experimental programs were subject to significantly greater positive changes in their motor, intellectual, and emotional behavior, than children who were denied the opportunity.

2. Of the specially planned experimental programs the physical education programs proved to be superior in modifying motor performance, the art program was superior in modifying the emotional behavior of the younger children, and the programs played an equal role in modifying the intellectual behavior of the children.

3. The physical education program which was oriented towards the individual rather than the group was more successful in eliciting changes in the motor, intellectual, and emotional parameters of behavior of the children.

4. Positive changes in behavior occurred more frequently in the older than the younger children, more often in the minimally brain injured than the retarded children, and appeared more likely to occur in the boys than the girls.

CHAPTER ONE

BACKGROUND AND PURPOSE OF THE INVESTIGATION

Introduction

A concept which has made only limited impact on the majority of those in physical education and special education is that mentally retarded children and minimally brain injured children may profit from school programs of physical activity. In many quarters there is a growing belief that many of the physical, intellectual, social, and emotional needs of these children can be met through properly planned physical activity programs. Clinical reports to this effect are numerous, but experimental evidence in support of this point of view is not impressive. The research conducted to date has been carried out with very small samples of children over short periods of time under conditions with limited experimental control. Thus, little factual information is available regarding the influence which physical activity programs have on children with physical or mental impairment. Furthermore, little if any attention has been given to the nature of the physical activity programs which might be most suitable for these children. The nature of the disability and the child's attitudes toward his limitations suggest that the setting in which instruction takes place may well be a critical factor in promoting optimum development.

The present research is addressed to the general question, "what effects, if any, do specially planned programs of physical activity have upon the physical, intellectual, social, and emotional development of educable retarded children and minimally brain injured children?" This would seem to be an important question in view of the fact that most educators believe that instruction in physical education should be a part of the school day of all children. Yet a recent study (121) has shown that almost half of the mentally retarded children in the public schools of this country have no physical education instruction. It is not surprising that the level of motor performance is low in children who rarely are given the opportunities afforded to others. One might ask if the degree of retardation in physical skill noted by numerous investigators (120)is necessary and if perhaps improvement in this function might have a significant impact on other aspects of development.

Several reasons have been proposed in explaining the lack of school physical education for mentally retarded and minimally brain injured children. First, since their classes are established primarily because these children do not make normal progress in the traditional school subjects the emphasis is upon academic work. Secondly, the minimally brain injured child is frequently denied physical education, since many authorities in special education feel that gross movements should be inhibited, to be replaced by a very stereotyped, tightly-structured school routine. A third reason is the shortage of physical education teachers who are qualified to teach these children.

Whatever the reasons, the fact is that physical education lessons are not a part of the day for many children in special education. A recent nationwide study(121) showed that only 25% of all educable mentally retarded children in the public schools have sixty minutes or more of physical education each week. Several investigators (40, 93, 106, 107, 147) have reported that positive changes in behavior, may be ellicted by the addition of physical activity lessons to the daily school schedule. For the most these studies have dealt with very small groups of children, the programs have been narrow in their concept, and have usually been limited to adolescent boys. Difficulties in research design have also been noted. The present study was designed to examine, on a larger scale, the tenets set forth in previous studies under conditions which might reasonably be expected to prevail in a normal school setting.

Purpose and General Plan of the Study

The general purpose of this research was to assess the role of educational[1] physical activity programs in the modification of the motor, intellectual, social, and emotional behavior of educable mentally retarded children and minimally brain injured children of elementary school age.

In an attempt to achieve this purpose several considerations had to be kept in mind. First, there was the possibility that special treatment of these children, in the way of a special instructional program might in and of itself ellicit changes in the behavior of these children. Second, it was possible that one type of physical activity program might be more effective than another or that an activity of a non-gross motor type might be as effective as physical activity programs in affecting particularly aspects of behavior. Third, there was the possibility that children might be affected differently according to chronological age, sex, and type of disability. Hence, it seemed important that these considerations be included in the plan of the research.

In view of the above, the design of the study called for three types of experimental treatments and a control condition. One treatment, a special instructional program involving no gross motor activity and was used to control for the Hawthorne effect. The activity used for this purpose was Art which was given each day equivalent in time to the physical education lessons.

Two distinct programs of physical education were used to test the possibility that the type of physical activity program was important in affecting changes in behavior. One was a program in which the children always worked alone. The other was a program in which children always worked in pairs or in groups. The rationale for the use of the individualized approach rests upon the belief held by some that mentally retarded children and brain injured children need to have the security of working individually at their own level where the distractive and perhaps disturbing influences of their peers are at a minimum - where the tensions and frustrations of invideous comparisons and competition for peer status are practically non-existent. On the other hand, it is held by some that the traumatic effects of group inter-action in motor skill development for these children are not great and that the social values resulting from group play far outweigh their possible negative influences on skill learning.

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[1] This type of program differed conceptually, and practically from previously used programs, for example, those using recreational or fitness activities.

Since a primary purpose of the physical education instructional program is to help children become reasonably proficient in the motor activities of our culture and at the same time develop desirable patterns of social behavior, an investigation of the influence of programs with these two distinct types of orientation would seem to be worthwhile.

Scope of the Investigation

This study involved the cooperative efforts of the University of Wisconsin, Department of Physical Education, and the Galena Park, Pasadena, and Deer Park Independent School Districts in Harris County, Texas.

All the educable mentally retarded children and minimally brain injured children in the elementary schools of the three districts participated in a twenty-week instructional program. This involved 275 EMR children and 205 MBI children. Classes were grouped according to the type of disability and further sub-divided into two age categories. From each disability and age group of classes random procedures were used to assign classes to one of four experimental treatments. Two treatments involved physical education programs, and two involved no physical activity. Of the nonphysical activity treatments, one group of classes had art lessons, and the other followed the usual instructional classroom program.

The physical education and art instruction was provided by the class teachers for approximately thirty-five minutes each day for twenty teaching weeks.

A large number of standardized tests, selected to assess four major parameters of behavior (motor, intellectual, social, and emotional), was completed by the children prior to and at the conclusion of the experimental program. In-service training of the teachers preceded the testing and the instructional programs.

Review of Literature

Physical Education for the Educable Retardate

The literature on physical education for the educable retardate refers consistently to the Packwood experiment, reported from England by Oliver in 1958 (107) in which two groups of educationally subnormal adolescent boys, attending two residential schools, acted as experimental and control groups respectively. Over and above the usual school routine, the experimental group was given a specially planned ten-week program of physical education, of which the largest proportion of the work was of a progressive resistence nature. Activity of a recreational and remedial nature was also included, giving the subjects in the experimental group (N-19) almost three hours of physical activity each day. The control group (N=20) was limited to their usual instructional program of two classes and an organized games lesson each week. Prior to, and at the end of the study a series of teste was administered as follows:

The Terman-Merrill Test
Goodenough Drawing of a Man Test
Raven's Matrices
Porter's Maze
Goddard's Form Board
Tests of Motor Educability, Athletic Ability and Physical Fitness

Siggificant gains in favor of the experimental group were reported for every item except Motor Educability, Raven's Matrices mental age, and Goddard's Form Board mental age.

The significance of the improved physical qualities of the boys was not unexpected, since the nature of the physical activity had been toward this end. However, it is the improvement in the intellectual and emotional characteristics of the boys in the experimental group which has been the subject of much debate and some research. The emotional overtones associated with the project are cited by Oliver as being responsible for such behavioral changes; four reasons were suggested to be working in combination with each other:

> "1. The effect of achievement and success and improved confidence that is associated with these feelings.
> 2. Improved adjustment and the happier atmosphere that arises from it.
> 3. Improved general fitness and the feeling of well-being that goes with it.
> 4. The effect of the feeling of importance that the boys must have had at having so much interest and attention centered in them." (107:163)

The reference here was to the existence of the Hawthorne effect. Interestingly, in spite of the large amount of time spent by the boys, out of the classroom, no deterioration in the basic subjects was demonstrated. The conclusion made by Oliver was that:

> ". . . greater emphasis should be placed on the physical education of sub-normal children. More time should be devoted to physical activities and greater demands should be made on the children." (107:164)

Discussion of this study seems to concern itself more with the possibility of change being elicited by the physical education program, rather than the associated overtones which Oliver suggested for the measured behavioral changes. It was the climate within the classroom which changed. Obviously children who are given attention, well-planned educational experiences, success and achievement are more highly motivated, they are more at ease in their inter- and intra-personal relationships, and are thus more likely to perform at a higher level on a battery of tests.

In 1966 Corder(40), in this country, attempted in a single project to replicate, modify, and improve upon Oliver's work. Corder worked with adolescent boys from co-educational classes enrolled in public school classes for the educable mentally retarded. Twenty-four boys were equated on chronological age and intelligence quotient and assigned in equal numbers to three groups (N=8): a. training b. officials, and c. control. The training group was given progressive resistence work for one hour every day for four weeks. The officials group accompanied the training group but did not participate in the physical activity; the boys were responsible for recording, timing and procedures involving the organization of the program. Corder cites the use of this group "to study the anticipated Hawthorne effect"(40:359). The control group remained in the classroom receiving their usual instructional schedule.

Pre testing and post-testing were completed on the following items:

The Wechsler Intelligence Scale for Children
The AAHPER Youth Fitness Test Battery
The Cowell Personal Distance Scale

Examination of the data was by gain-scores, and the improvement in the intelligence quotient noted by Oliver was confirmed. Statistically significant differences, at the 5% level, were reported between the training and control groups on the full scale of the WISC, and similar differences occurred on the verbal scale of the WISC. No other statistically significant differences between the three groups was found on this criterion, indicating that there was no differential increase in the scores of the training group over the officials' group. This was taken by Corder to indicate that "the Hawthorne effect . . . was probably operating"(40:362). That there occurred no difference between the officials and control groups was proof to Corder that:

> ". . . the Hawthorne effect plus additional factors must have been functioning, which accounted for the gain scores made by the training group." (40:362).

No differences among the three groups, using the Cowell Personal Distance Scale as the criterion measure, were noted.

Statistically significant differences at the 5% level occurred on every item of the AAHPER Youth Fitness Test Battery, when a comparison was made between the training group and the control group. Only on one event (the 50-yard dash) did the officials group significantly outperform the control group.

In general the results of Corder's work closely resembled those reported earlier by Oliver. The work, however, appeared to address itself to the type of program rather than the learning environment given to the children.

A third major study, recently completed by Solomon and Pangle (130) was essentially attempting to answer the same questions as were those of Oliver and Corder. In addition, the study sought information on the permanency (or transiency) of any gains demonstrated during the experimental period.

In this study 41 adolescent boys, enrolled in four public school coeducational classes, within two schools, for educable mentally retarded children were assigned by class to one of four experimental treatments (N-12, 12, 11, 6). Two classes were taught different types of physical education lessons; one where reinforcement was immediate, the other where reinforcement was both delayed and de-emphasized. One class was given "quiet games". ". . . table games and group activities which involved little or no physical exertion" (130:9). This group was included to control for a possible Hawthorne effect. The fourth class received no experimental treatment, but followed their usual instructional program.

The special education class teachers taught the lessons for approximately 45 minutes every day for seven weeks. Test data were obtained on the following items:

Stanford-Binet Intelligence Scale (form I)
50-yard dash
Sit-ups
Chins
Predicted Total AAHPER Score
Grip Strength (preferred hand)
Level of Aspiration
Locus of Evaluation
Locus of Control
Self Concept (Piers and Harris Scale)

Using gain score analysis from the pre-test and post-test data, the authors reported statistically significant differences were achieved for four variables: the 50-yard dash, sit-ups, chins, and predicted AAHPER total score. It was shown that (a) the immediate reinforcement class was equal or superior to the other groups, (b) the remote reinforcement class was superior to the quiet games and the control groups, and (c) the quiet games class showed no improvement over the control group. Such results are not dissimilar from those reported in earlier research studies (40, 107).

Six weeks after the experimental treatments were terminated the stability of significant gains demonstrated in the post-test analyses were assessed. In all cases scores exceeded the pre-test scores, some having improved since the post-tests, and some showing a performance decrement.

Solomon and Pangle made several general conclusions from their research:

1. Levels of physical fitness performance in EMR boys were improved as a result of participation in a structured program of physical education, some permanency was noted in the increases.

2. The immediate reinforcement program appeared more effective in achieving improved physical fitness than did the remote reinforcement program.

3. No operant Hawthorne effect associated with physical fitness improvement was noted.

4. There was no significant improvement in the intelligence quotients of any group.

5. No significant changes occurred for the following items:

   grip strength
   level of aspiration
   locus of control
   locus of evaluation
   self concept

The results of this study both supported and contradicted the previously reported research. The most important aspects of this study as it related to other research were:

1. Research indicating that achievement levels of physical fitness in EMR boys can be improved -- was supported.

2. The role of the Hawthorne effect, and the previously reported improvements in I.Q. were not supported.

These studies, differing as they did in many ways, produced results that were remarkably similar. Corder was able to closely follow Oliver's findings. Lowe (93), in England, attempted to replicate Corder's study, and despite several fundamental differences in the research, the results were similar. Pangle and Solomon alone were unable to demonstrate the role of the Hawthorne effect, nor were they able to report improvements in measured intelligence. Very serious questions, however, can legitimately be levelled at the post testing in the Pangle and Solomon study. Though the timing of the testing was admissibly inappropriate and the testing condition on the part of the boys was poor, the results of the tests are presented as though the testing procedures were satisfactory. Therefore, it is highly likely that the behavioral changes reported by Oliver, Corder and Lowe would have been supported, had the final series of tests been carried out in conditions conducive to optimal test performance.

Physical Education for the Trainable Retardate

Working with trainable retardates (N=11), Nunley (106) reported similar results to those of Oliver, Corder, and Lowe. The motor ability of these eleven teenage retardates was assessed on a thirteen-item battery designed to measure some basic developmental activities, some gross motor activities, fine motor function, coordination, and strength. The battery was readministered at the end of a fifteen-month program. Participation in physical education was for approximately forty minutes each day. The program was constructed to achieve two goals; the ability to respond to commands and movements, and conformity to group activity. A large range of activities, requiring low mental processes by the children, was used.

At the end of the program gains were noted in strength, endurance, improved adjustment, and socialization. No tests of statistical significance were applied but Nunley reports ". . . the gains are nonetheless obvious and the possibilities exciting." (106:953). Pre-test Stanford Binet intelligence tests were administered to establish mental age and intelligence quotient. No post-testing for this variable was completed. The research appeared very similar to that completed with educable mentally retarded children.

Physical Education for the Minimally Brain Injured

Interest in the motor development, learning and performance of minimally brain injured children has been limited largely to the evaluation of their performance on perceptual motor tasks.

There is some evidence that children with diagnosed or presumed neurological impairment do show gains in many aspects of development after involvement in physical activity programs. For example, Barsch (147), exposed eighteen children with special learning disabilities to a movigenic curriculum which involved gross motor tasks encompassing twelve dimensions[2].

The acknowledged aim of the movigenic curriculum for children with specific learning disabilities was:

> ". . . to correct whatever impediments stand in the way of the child taking full advantage of the offerings of the regular curriculum." (147:3)

Suggesting that previous methods of explaining the characteristics of children with special learning disabilities in terms of intellectual or psychological approaches were unsatisfactory, Barsch postulated that an approach to education through physiological means should exist. Hence, for these children it was not a lack in intellectual ability or the presence of emotional problems that accounted for difficulties in school learning, but because of the deficits in the functioning of the visual, auditory, kinesthetic and tactual skills and processes: ". . . in broad terms this approach regards the child as a sensory-perceptual-motor organism. . ." (147:4). The aim of the project was to establish the theoretical movigenic curriculum into the school situation. The experimental curriculum was itself attempting:

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[2] The dimensions were muscular strength, dynamic balance, spatial awareness, visual dynamics, auditory dynamics, kinesthesis, tactuality, bilaterality, flexibility, rhythm, and motor planning.

> ". . . to achieve a state of physiologic readiness in the learner to bring the children to a level of total organization which would enable them to profit from the existing curriculum." (147:5)

Initially the program of movigenics was established with regard to details concerning the curriculum and the teacher. Follow-up work has not been reported. Unfortunately, no standardized instruments of evaluation were used, and it is, therefore, difficult to assess the value of the program itself, or to determine the effects of such a program on boys and girls of different chronological age or intellectual ability. However, Barsch noted that in addition to the observed improvements on each dimension of physical activity, positive changes also occurred concurrently in social and emotional adjustment. Hence, Barsch's clinical findings are in a sense similar to those reported earlier by Oliver and other researchers. As a result of the pilot program Barsch writes that:

> ". . . movement-oriented efficiency supplement to a regular curriculum holds promise of making a significant contribution to the optimal achievement of children with learning disorders." (147:41)

In general, the findings of several researchers have been in agreement in suggesting that positive changes in motor performance and intellectual functioning have been associated with the addition of physical education lessons to the daily schedule of special education classes.

Although the level of motor performance of educable retardates is known to be from two to four years behind that for children of normal intelligence, it has been demonstrated that these children seldom receive opportunities to participate in school physical education lessons. When given the opportunities, gains in motor performance have been noted.

There is evidence that educable mentally retarded children, and minimally brain injured children exhibit social behavior which is not conducive to optimal classroom achievement. The expectancy of failure which has been a reported feature of their attitude, has also contributed to problem behavior.

The research reviewed, therefore, has indicated the possibilities for motor and psychological behavior to be improved. Educational physical activity programs which are geared to the needs and characteristics of the children, afford the possibility for improved motor performance through the building of a wide repertoire of movement experiences. Careful planning and teaching can ensure that enjoyment and achievement can result. It is held that the attention which the children receive may well elicit positive changes in psychological behavior.

CHAPTER TWO

PROCEDURES

The Research Design

According to school law, children spend ten or more years in school. Through the medium of the schools children are expected to acquire a vast array of knowledges and understandings. Yet, the conditions under which learnings are most efficiently accomplished are not fully known. Many factors influence and modify the processes of learning in school situations, and it is not surprising, therefore, that the effects of schooling are not easily assessed. The effects of schooling might perhaps be most effectively measured against subjects who had not been to school. This procedure is ordinarily not feasible. Others might suggest that the multiple factors operating in educational research could be minimized by "buying" a school district; that is, arranging the teachers and children into classes, by sex, age, race, intellectual ability, and other factors -- before the commencement of a project. In due deference to accurate research results, such a procedure might be desirable; real schools, however, present the true picture even though the interpretation is usually difficult. In real schools, it is ordinarily necessary to make comparisons of groups who have been subjected to different types or quantities of school programs.

Some investigators (44, 45) have sought to stress the experimental program as the reason for the results of their research. Others have stressed other factors; Oliver (107) mentioned the emotional overtones being accountable for the behavioral changes (successful experience being basic to progress in the classroom), Corder (40) and Lowe (93) cited the Hawthorne effect, the existence of which was not demonstrated by Solomon and Pangle (130). The difficulty in measuring the effects of schooling, free from the contamination of the Hawthorne effect have imposed serious limitations on much of the research on this problem.

In the present research the experimental design specifically attempted to account for the Hawthorne effect. Of the four experimental treatments, only three were specially planned programs of work which were different from the usual school routine for the groups. A comparison could therefore be made between those having a special treatment, and those having no special program whatsoever. Of the special treatments two involved physical education programs which allowed for a comparison between programs where the social organization of the classes (individual vs. group) was different. The other experimental treatment was a specially planned art program involving no gross motor activity. The children in all three experimental programs were fully aware that they had a special program, but were unaware that the central focus of the project was on physical education. It was a difference in the nature, and not the quality of the treatment which was planned. It was believed that the procedures outlined attacked the problem of the Hawthorne effect in a realistic, meaningful manner, and insofar as those procedures were successfully accomplished, the research results presented later in this report make a contribution to the knowledge being accumulated on the effects of schooling on groups of special education children.

In summary the research sought answers to the following questions:

1. What are the differential effects, if any, on the motor, intellectual, social and emotional development of children who follow the three experimental programs, (two physical education and one art program) compared with those who pursue their usual classroom instructional program?

2. Are there differences in the motor, intellectual, social, and emotional development of children who follow the special physical education programs, in comparison to those included in the art program?

3. What differences, if any, are there in the motor, intellectual, social, and emotional development of children in the individual physical education program as compared to those in the group-oriented physical education program?

In answering the above questions, due consideration was given to the effects of disability, chronological age and sex.

The Subjects and Their Assignment to Treatments

The subjects for this study were enrolled in the classes for educable mentally retarded children and minimally brain injured children in the elementary schools of the Galena Park, Deer Park and Pasadena Independent School Districts of Harris County, Texas. Every child identified and placed in such classes took part, subject to appropriate medical screening procedures. Policies and procedures governing the identification and placement of these children were formulated at the State level by the Texas Education Agency, and at the local level by the School Districts' Special Services Departments.

The responsibility for allowing each child to participate rested with the School Districts. Where doubt existed medical records were examined and a small number of children were excluded from the experiment because they were unable to take part in the special treatment program to which their class had been assigned.

A total of forty-nine classes of children were involved in the project; twenty-five classes of educable mentally retarded children, and twenty-four classes of minimally brain-injured children. The distribution of classes by disability and age, according to school district is shown in Table 1.

TABLE 1.

NUMBER OF CLASSES BY DISABILITY AND
AGE LEVEL, ACCORDING TO SCHOOL DISTRICT

	EMR		MBI	
	Younger	Older	Younger	Older
Galena Park	5	5	3	4
Deer Park	3	1	3	2
Pasadena	4	7	6	6

Approximately 510 children took part in the study, although some attrition occurred as children moved into and away from the project classes during the program. The number of children who completed the program, by cell is shown in Table 2. Since the study addressed itself to the question of the developmental changes observed over the six-month period, data only from children who underwent both sets of test (pre and post) were analyzed. There appeared no reason to suggest that attrition occurred which was attributable to any factor related to the conduct of the study.

Classes were grouped according to disability (EMR and MBI), and chronological age[1] (Younger and Older). From each of the four groups of classes, Younger EMR, Older EMR, Younger MBI, and Older MBI, classes were assigned to one of the four experimental treatments. A table of random numbers was used first to assign classes to the four groups, and used again to assign a group of classes to an experimental treatment. The results of these procedures are shown diagrammatically in Figure 1.

The geographical location of the School Districts and the location of the schools where EMR and/or MBI classes were housed are presented in Figure 2.

Treatment of the Data

In order to assess the role of the experimental programs in modifying the behavior of groups of special education children, two sets of data were collected. The children were tested prior to, and at the conclusion of the teaching programs. Data were collected on the several test items which had been chosen to evaluate five parameters of behavior. Master data sheets were drawn up, and data was then transferred to computer cards.

The central focus of the research was upon the modification of the behavior of classes of elementary school children, categorized according to their disability, chronological age, and sex. To assess behavioral change, four experimental programs were employed. A diagrammatic representation of the research design has been included as Figure 1.

In assessing change in the several parameters of behavior data were secured on 32 test items. A computer program[2] entitled "Multivariance: Univariate and Multivariate Analysis of Variance and Covariance" was used on a C.D.C. 3600 computer at the University of Wisconsin computing Center. The program was adapted for U.W.C.C. users by Mr. James Bavry,[3] University of Wisconsin, Research and Development Center for Cognitive Learning, of the Department of Educational Psychology.

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[1] The Younger children were aged six to nine years, and the Older children were aged ten to thirteen years.

[2] The program was originally developed in the Statistical Laboratory of the Department of Education, University of Chicago, and was modified by Mr. Jeremy D. Finn, State University of New York at Buffalo, Department of Educational Psychology.

[3] The help and guidance of Mr. Bavry in the use of the program is gratefully acknowledged.

TABLE 2

THE NUMBER OF CHILDREN WHO COMPLETED THE PROGRAMS: A DISTRIBUTION ACCORDING TO DISABILITY AND TREATMENT

		Treatment				
EMR:	Younger	1	2	3	4	Totals
	Boys	20	21	20	16	77
	Girls	13	15	11	7	46
					Total	123

EMR:	Older	1	2	3	4	Totals
	Boys	17	24	22	22	85
	Girls	23	10	13	21	67
					Total	152

MBI:	Younger	1	2	3	4	Totals
	Boys	16	22	18	23	79
	Girls	6	3	6	2	17
					Total	96

MBI:	Older	1	2	3	4	Totals
	Boys	23	22	18	17	80
	Girls	5	8	10	7	30
					Total	110

EMR	275
MBI	206
TOTAL	481

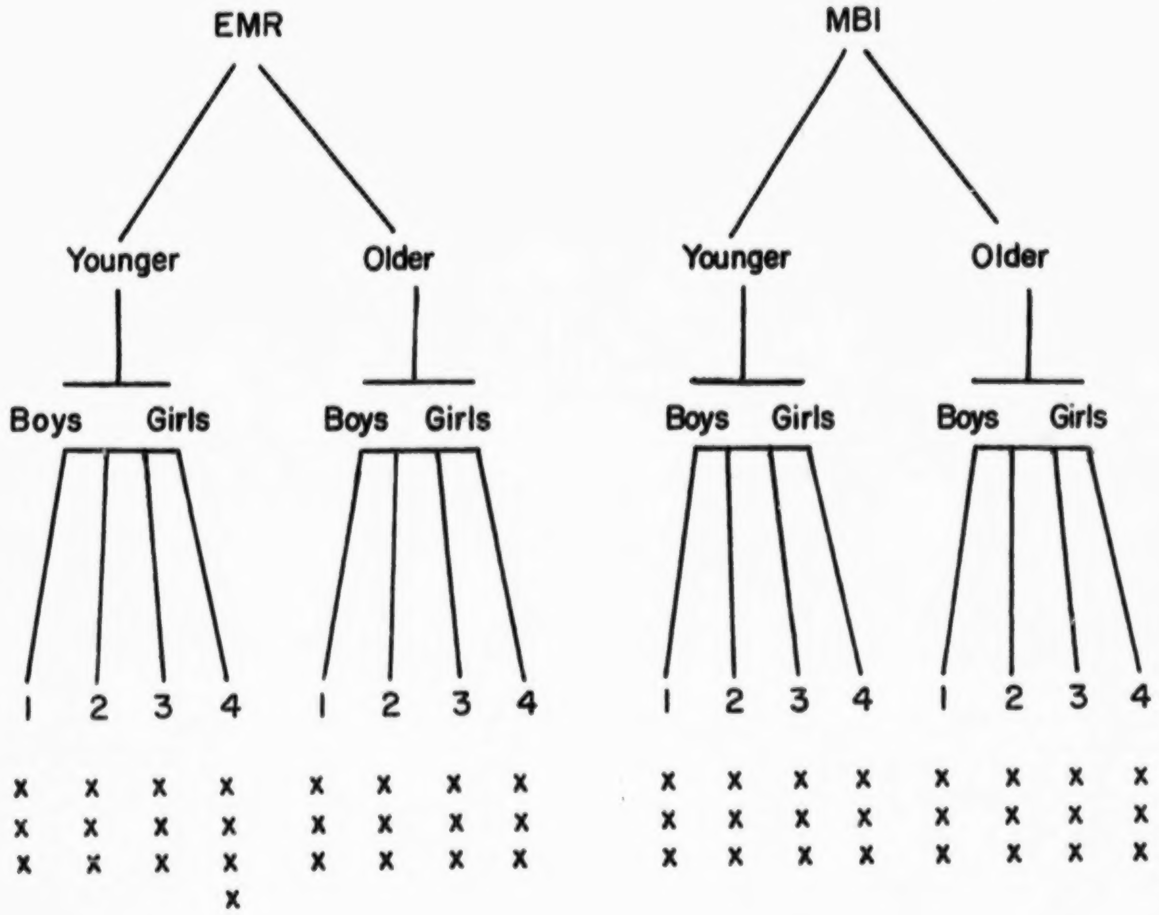
EMR
MBI
Younger
Older
Younger
Older
Boys
Girls
Boys
Girls
Boys
Girls
Boys
Girls
1
2
3
4
1
2
3
4
1
2
3
4
1
2
3
4

FIGURE I. THE RESEARCH DESIGN: DISABILITY X AGE X SEX X PROGRAM (with number of classes)

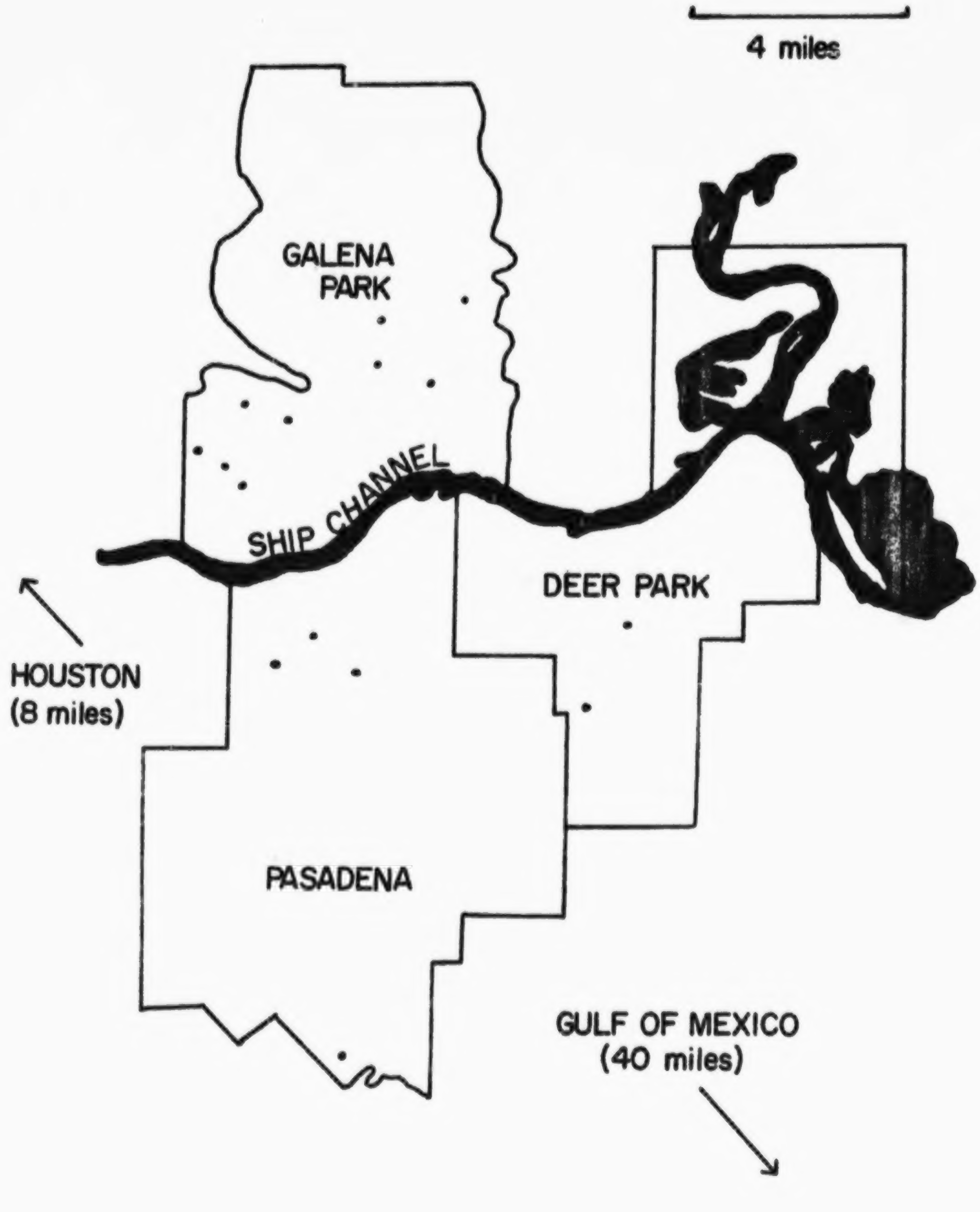
4 miles
GALENA PARK
SHIP CHANNEL
DEER PARK
HOUSTON (8 miles)
PASADENA
GULF OF MEXICO (40 miles)

FIGURE 2. THE GEOGRAPHICAL LOCATION OF THE SCHOOL DISTRICTS, AND THE SITES OF THE SCHOOLS IN WHICH WERE PARTICIPATING CLASSES

The experimental design[4] was a four factor design. Three factors, disability, age, and sex, each had two levels, and one factor, program, had four levels. Dependent variables were grouped according to five parameters of behavior. For each dependent variable, class means, subdivided by sex, were used in the multivariate analysis.

In this research it was practical to use intact classes of children and to assign the classes to the experimental treatments by random methods. Since the need to examine the differences in the performances of the groups at the conclusion of the program was apparent, but that post-test performance itself would be a function of performance before the program, analysis of covariance procedures were employed. Errors in sampling procedures could thus be adjusted so that the significance of the differences between the adjusted means could be determined. The analysis of covariance procedure is an application of regression analysis whereby the influence of the independent variable (in this research, the pre-test mean) is removed by linear regression. The computer program used the least squares method in fitting a straight line to the data.

For each hypothesis tested the procedure calculated an overall F value for the vector of variables, and also provided univariate F values for each dependent variable in the vector. A 5% level of significance was used to determine whether the null hypotheses were tenable.

For each of four parameters of behavior, fifteen hypotheses were initially tested. Since it was necessary to administer personality questionnaires to the younger and older subjects, a separate analysis was used in treating the data on emotional behavior. This analysis was essentially a three-factor design in which separate but identical analyses were used for each of the two age levels.

Of the hypotheses, those for which overall significant F values had been obtained were re-examined for two reasons. First, it was necessary to obtain the adjusted means for each item in each vector so that the direction of a reported difference could be described, for example, where significance occurred for a factor with two levels. In the second place, the calculation of the planned comparisons was needed using the within cells error term. Since one factor (experimental programs) was of four levels the investigator was able to carry out either the planned comparisons described, for example, by Hays (69), or follow one of the comparisons by post hoc methods, for example, the Scheffé method. It has been clearly indicated by Hays that the decision regarding which procedure should be followed, should be made prior to the analysis of the data. This has been done. Whilst post hoc comparisons perhaps provide more information in detail, of reported differences between the dimensions of the factor, Hays suggests that:

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[4] The guidance of Mrs. Mary Quilling, Mr. James Bavry, and Mr. Tom Houston in the design of the research is gratefully acknowledged.

> ". . . the 'big guns' of planned comparisons should be reserved for the really important questions, where one wants to be almost sure to detect true differences from zero where they exist." (69:489).

Three very important questions were asked in this research, which related to the differences which occurred between:

The special treatment programs versus the non-special treatment programs.

The physical education special treatments versus the art program.

One physical education program versus the second such program.

In the method of planned comparisons there was a requirement that the number of comparisons made was one less than the number of compared means (in this case, adjusted means). This was the same as making the same number of comparisons as there were degrees of freedom. Further to this was the requirement that the comparisons were independent.

The weights assigned to the planned comparisons have been listed in Table 3.

TABLE 3

ASSIGNED WEIGHTS FOR THREE PLANNED COMPARISONS

	Experimental Program			
Comparison	Individual P.E.	Group P.E.	Art	Usual
1	+1	+1	+1	-3
2	+1	+1	-2	-0
3	+1	-1	-0	-0

Assessing the Parameters of Behavior

Introduction

The success of any research project depends upon the quality of the experimental programs and the sophistication of the instruments of evaluation. The selection of tests to meet the requirements of validity and feasibility of administration was a major problem. The number of subjects involved, and the parameters of behavior to be assessed were such that feasibility was a matter which could not be ignored. The following describes some of the considerations which affected test selection.

1. The age, intellectual level and achievement of the children precluded the use of many tests. For example, few tests have been designed for children with limited verbal and performance skills.

2. The number of participants in the project (in excess of 500), and the need to test during a limited duration of time, eliminated long tests that required the presence of trained and experienced school psychologists. Hence the Binet or Wechsler tests were not used.

3. Since classroom teachers were to be involved in testing their own children, problems of organization were anticipated. Hence the tests used were chosen in order to cause a minimum of disturbances within the class.

Motor Performance

This aspect of behavior was assessed by the Modified AAHPER Test Battery. This test battery is a modified version of the Physical Fitness Test published by the American Association for Health, Physical Education, and Recreation (1). The modified battery which entailed a change in three of the AAHPER test items was found appropriate for use with EMR children and was used successfully in a nation-wide study of retarded children (120).

The seven items purport to measure basic components of physical fitness, such as muscular strength, speed of movement, agility, coordination, and endurance. While some would argue that these tests are crude measures of these components, they do nevertheless include many of the basic skills and abilities required for successful participation in the physical activities of childhood and youth.

The following is a description of each of the test items in the Modified AAHPER Test Battery as administered in the present study:

Flexed Arm Hang

An horizontal bar was adjusted to the height of the subject. Where necessary, a portable doorway gym bar was used. The subject was instructed to take an overhand grasp (palms facing away from the body), and was assisted to a position where the body was raised completely from the floor, the chin was above but not touching the bar, and the elbows were flexed. A stop watch was used to record, to the nearest one-tenth second, the length of time the subject held the position. One correct trial only was given.

Sit-Ups

The subject assumed a supine position with the legs extended and feet approximately shoulder width apart. The fingers were interlaced and the hands placed at the back of the neck. A partner held down the subject's ankles, the heels being in contact with the floor at all times. The subject then sat up, turning the trunk to the left and touched the right elbow to the left knee. After returning the trunk to the back lying position, the subject again sat up, turning the trunk to the right and touched the left elbow to the right knee. The exercise was repeated, alternating sides.

One point was given for each complete correct movement of touching the elbow to the knee. The number of sit-ups the pupil executed in one minute constituted the score. One trial only was given.

Shuttle Run

Two parallel lines were marked on the floor, 30 feet apart. Two blocks of wood, two inches by two inches by four inches were placed a few inches apart, behind one of the lines. The pupils started from behind the other line. On the signal "Are you ready? Go!" the pupil ran to the blocks, picked up one and returned to the starting line where he placed the block. He then ran to pick up the other block which he carried back across (past) the starting line. Two trials were given, with the better elapsed time counting as the score. Timing was to the nearest tenth of a second.

Standing Broad Jump

The pupil stood with the feet several inches apart, very close to but not touching the take-off line. Preparatory to jumping, the pupil swung the arms backward and bent the knees. The jump was accomplished by simultaneously extending the knees and swinging forward the arms.

Each pupil was allowed three trials, and the best trial, measured in inches from the take-off line to the heel or part of the body that touched the floor nearest to the line, was the score. The measurement was made in feet and inches to the nearest half-inch.

50-Yard Dash

Two pupils were tested at the same time. Both took the position behind the starting line. The signal "Are you ready? Go!" was given, the last word accompanied by a downward sweep of the starter's arm to give a visual signal to the timer, who stood at the finishing line. The score was the elapsed time between the starter's signal and the instant the pupil crossed the finishing line. One trial was given, and the time was recorded in seconds to the nearest tenth of a second.

Softball Throw

The pupil threw a 12-inch softball from a designated point behind a restraining line. Three throws were allowed, and the longest throw was measured from the throwing point to the landing point. Only overhand throws were allowed, and the distance was measured to the nearest six inches.

300-Yard Run

On the signal "Are you ready? Go!" the pupil ran the 300-yard distance which was marked out. Walking was permitted but discouraged. The time in minutes and seconds was taken to the nearest tenth of a second. It was possible to have at least two pupils running at the same time, and each was individually timed.

The Reliability of the Test Items

Several studies have examined the degree to which the tests were reliable (57, 59, 133). There appears, however, no study that has extensively examined reliability and validity as pertaining to sub-normal child populations. The use of the motor performance items to measure facets of the many types of skills which society has emphasized in childhood motor proficiency led to validity of the tests being claimed on logical grounds.

As a part of a large study which attempted to describe the dimensions of physical fitness, Fleishman (57), working with eighteen year old Navy recruits, reported the following test-retest reliabilities:

Arm Hang	0.77
Sit-ups	0.72
Shuttle Run	0.85
Broad Jump	0.90
50-Yard Dash	0.86
Ball Throw	0.93
600-Yard Run	0.80

Several of the items differed in the procedures, from those used in this research.

Working with Junior and Senior High School boys and girls, and testing exactly according to the AAHPER directions (1), Stein (133) reported test-retest reliabilities all of which were significant beyond the 0.001 level:

Pull-ups	0.981
Sit-ups	0.958
Shuttle Run	0.832
Broad Jump	0.900
50-Yard Dash	0.924
Ball Throw	0.931
600-Yard Run	0.740

These substantial research findings were thought to be sufficient to proceed with the test items, albeit in a modified form.

Test Administration

All test items were conducted according to the instructions outlined by Rarick (2, 120). The battery was administered to groups of classes who were tested at a central location during the course of a morning. Classes were grouped for testing according to the School District (transportation difficulties and actual distance precluded a different organization being adopted). Within each School District classes were grouped so that there were as few transportation complications as possible, so that the number of children taken to a central location could be manipulated with the same testing procedures, and so that not more than a two-hour period of time was used. The grouping of classes was completed so that six mornings were required to test the forty-nine classes. These procedures were the same for the pre-testing and the post-testing.

Upon reaching the test area the children were informed of the general test procedures. After having been assigned to the first activity arbitrarily, each class rotated from activity to activity as follows:

Standing Broad Jump
Shuttle Run
Sit-ups
50-Yard Dash
Ball Throw
Arm Hang

This rotation was adhered to except on an occasion when adverse weather conditions resulted in minor alterations in organization. Subject to this consideration, however, each child completed the above six test items before completing the 300-yard run.

At each testing station was at least one class teacher who was aided by one or more Senior High School boys.

The procedures for testing were reviewed with the teachers during the in-service meetings, and informally during other occasions prior to the testing. The boys, selected by the Physical Education Department of their school, were familiar with the tests, but detailed instructions of the procedures to be followed were given prior to the testing. The procedures resulted in standardized testing conditions.

The physical performance items listed above were carried out before the commencement of the experimental teaching programs, and again at the end of the project.

Strength Testing

Description of the Tests

A Naragansett hand dynamometer was used to measure the grip strength of the right and left hands. The instrument was inserted into a metal frame attachment for the pull and thrust measures.

The instrument was inserted into the palm of the hand of the standing subject; the dial was facing the palm, so that there was no possibility of the dial being touched by the fingers. The subject held the instrument towards the ground, and was instructed to make a short maximal squeeze in a downward direction, making sure that neither the instrument nor the subject's arm contacted the body.

In the pull and thrust measurements, the standing subject gripped the handles of the frame attachment, and held the instrument opposite but not touching the chest. The elbows were elevated so that the forearms were in an horizontal position. According to the test being performed, the subject was encouraged to pull or squeeze. For each item the subject was given two trials; the best trial being recorded as the score. Test Performance was measured in pounds of force.

The Reliability and Validity of the Tests

Upon an examination of the test descriptions, face validity was claimed for each of the four dynamometric grip strength measures.

Two particular studies, those of Jones (77), and Francis and Rarick (59), have dealt extensively with the reliability of the dynamometric grip strength items. Jones worked with boys and girls of normal intelligence, ages eleven to eighteen years. Test-retest and split-half reliabilities were calculated. The reliabilities were above 0.90 across age and sex. Working with mentally retarded boys and girls aged eight through adolescence, Francis and Rarick reported that performances were reliable for each of the four strength measures. All coefficients were above 0.86, and nearly all were above 0.91.

The Test Administration

Over 90% of the grip strength testing was carried out by a trained co-worker, who was experienced in the test procedures and also with working with the retarded and brain injured children. The remaining testing was carried out jointly with the program supervisor.

Intellectual Behavior

The intellectual behavior of the children was assessed by the following tests:

The Bender Motor Gestalt Test -- a performance measure.

The Peabody Picture Vocabulary Test -- a verbal measure.

The Bender Motor Gestalt Test

Description of the Test: The Bender Gestalt Test consists of nine figures which were presented one at a time and which the subject was asked to copy on a blank piece of paper.

> "Bender points out that the perception and the reproduction of the Gestalt figures are determined by biological principles of sensory motor action and vary depending on, (a) the growth pattern and

> maturation level of an individual, and (b) his pathological state either functionally or organically induced." (84:1).

Koppitz constructed a developmental scoring system, using composite scores for all nine figures, which differentiated between the distortions on the Bender which primarily reflect immaturity or perceptual malfunctioning, and those which were not related to age and perception but which reflect emotional factors and attitudes. Each figure is scored according to the number of deviations and distortions observed. A comprehensive text (84) provides in detail the ways in which such deviations and distortions are scored, and results in an objective method of scoring. The test cards have been included in Figure 3, and a copy of the scoring sheet has been included as Table 4.

The Reliability and Validity of the Test: It has been suggested that the reliability of this test must be considered from two aspects:

The degree to which different scorers agree in their use of the scoring system, and

The consistency of the test scores for individual subjects to whom the Bender Test has been administered more than once.

Few studies have been reported in which interscorer reliability has been examined. Koppitz cites the independent scoring of thirty protocols from young clinic patients. Pearson produc-moment correlations between the scores from all five raters were computed, being statistically significant and ranging from 0.88 to 0.96. When the correlations were converted into Z-scores and average inter-rater correlations were computed, results of 0.94, 0.93, 0.93 and 0.95 were obtained.

There are a number of difficulties attached to the reliability testing of the test scores. Neither the split-half form nor the alternate form methods are appropriate for this test, and hence the test-retest method is used.

> "Immediate retesting with the Bender would show the result of practice; while the long-time interval between test administrations would reflect the effect of maturation in visual-motor perception in a young child." (84:13).

In one study a compromise time of a four-month interval between tests was used. The subjects were classes of kindergarten and first grade children from low socio-economic area, and from a middle class community. Correlations ranging from 0.56 to 0.66 were all statistically significant at the 1% level. Koppitz suggests that this level is sufficient for the test to be used with confidence.

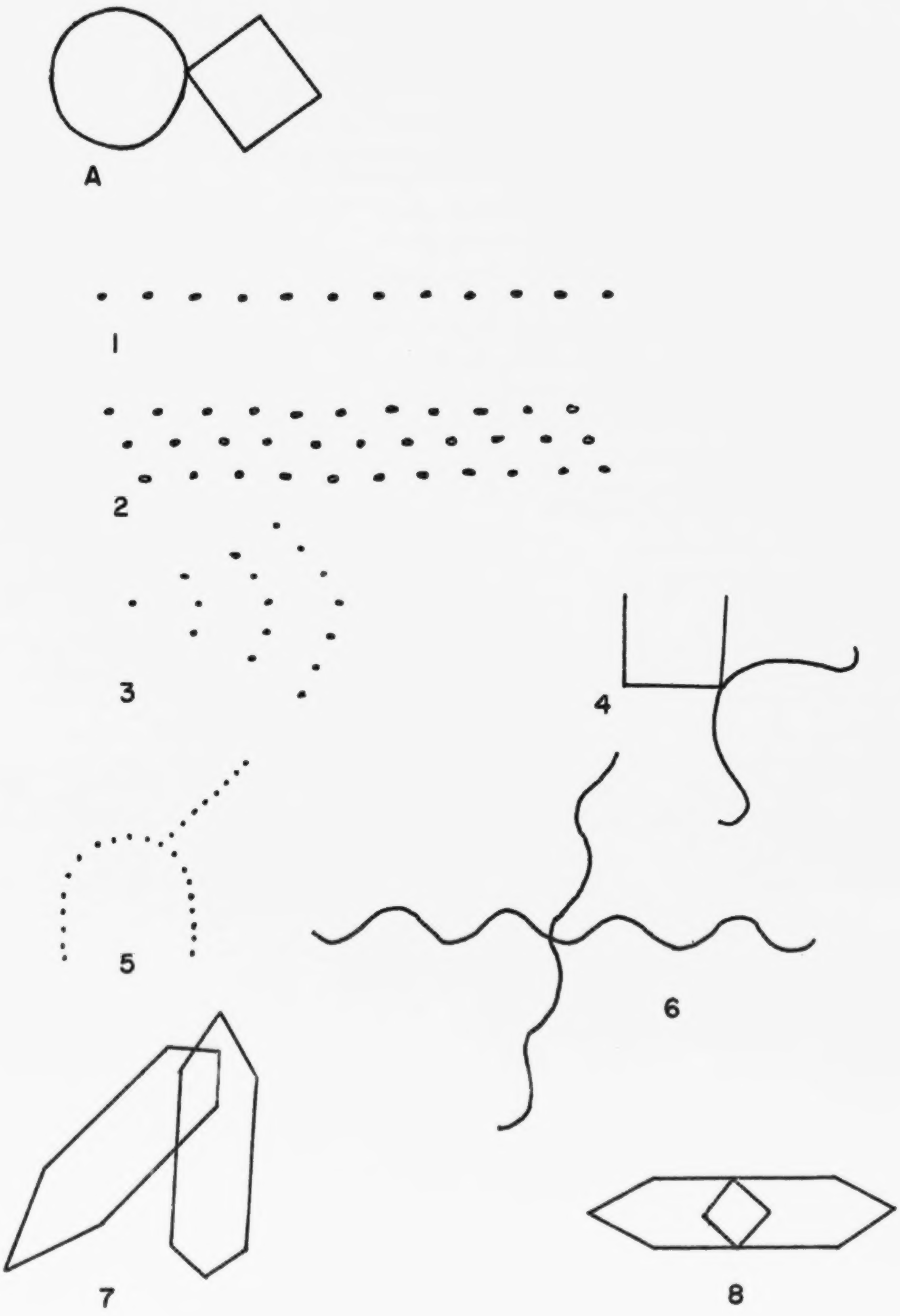

FIGURE 3. BENDER MOTOR GESTALT TEST: TEST CARDS

TABLE 4

BENDER MOTOR GESTALT TEST

SCORING SHEET

NAME________________________

MBI/EMR Y/O 1:2

KOPPITZ SCORING

Figure A
1a. Distortion of shape ____
1b. Disproportion ____
2. Rotation ____
3. Integration ____
Figure 1
4. Circles for dots ____
5. Rotation ____
6. Perseveration ____
Figure 2
7. Rotation ____
8. Row added, omitted ____
9. Perseveration ____
Figure 3
10. Circles for dots ____
11. Rotation ____
12a. Shape lost ____
12b. Lines for dots ____
Figure 4
13. Rotation ____
14. Integration ____
Figure 5
15. Circles for dots ____
16. Rotation ____
17a. Shape lost ____
17b. Line for dots ____
Figure 6
18a. Angles in curves ____
18b. Straight line ____
19. Integration ____
20. Perseveration ____
Figure 7
21a. Disproportion ____
21b. Incorrect angles ____
22. Rotation ____
23. Integration ____
Figure 8
24. Incorrect angles ____
25. Rotation ____

EMOTIONAL INDICATORS

1. Confused order ____
2. Wavy line (F. 1 & 2) ____
3. Dash for circle (F. 2) ____
4. Increasing size (F. 1, 2, 3) ____
5. Large size ____
6. Small size ____
7. Fine line ____
8. Overwork ____
9. Second attempt ____
10. Expansion ____

Total ______

TOTAL__________

The Bender-Gestalt Test was used in this study to provide a measure of Performance I.Q. — being a substutute for that portion of the Wechsler Intelligence Scale for Children. In a study with 90 elementary school children in the first four grades, Koppitz reported a close relationship between the Bender Test and the Performance I.Q. of the WISC "for all subjects regardless of age" (84:48). In analyzing the relationships between the Bender Test and performance on the individual sub-tests of the WISC by chi-square Koppitz concluded that: "the Bender Test can be used with some confidence as a short non-verbal intelligence test for young children, particularly for screening purposes" (84:50).

Test Administration and Protocol Interpretation: This test was administered by the class teachers to each child individually within the classroom, according to the instructions set out by Koppitz,(84:15) and at an appropriate time during the day. At the in-service meetings which were held prior to the pre-tests, professional guidance for the teachers was provided by Mr. James Woodward, School Psychologist for the Galena Park Independent School District.

The interpretation of the protocols was completed by Mr. Donald Gautney, of the University of Houston, who was trained and experienced in scoring according to the procedures outlined by Koppitz. Protocols were scored blind.

The Peabody Picture Vocabulary Test

Test Description: The Peabody Picture Vocabulary Test was designed to provide an assessment of a subject's verbal ability. This is accomplished by measuring hearing vocabulary, and is thought to have special value when used with children who cannot read or who have learning disabilities. A series of bold, clean line drawings, free of fine detail and figure-ground problems allows a response from a subject "between the chronological ages of 2 years 6 months and 18 years who is able to hear words, see the drawings and has the facility to respond in one of several approved ways" (51:25).

In the test manual, the advantages of the test as seen by the author are:

> "1. The test has high interest value and therefore is a good rapport establisher; 2. extensive specialized preparation is not needed for its administration; 3. it is quickly given in 10 to 15 minutes; 4. scoring is completely objective and quickly accomplished in one or two minutes; 5. it is completely untimed and thus is a power rather than a speed test; 6. no oral response is required; 7. alternate forms of the test are provided to facilitate repeated measures, and 8. the test covers a wide age range." (51:25).

The selection of the four words in any one plate was accomplished so that the words were equally difficult, characteristic of an age level, not culturally, racially or regionally biased, and showed no sex difference. The test involves the visual presentation of four pictures (a plate) together with the oral presentation of a stimulus word. The subject indicates the picture representing the stimulus word, by pointing, or stating its number. An example[5] of a plate appears as Figure 4.

The Reliability and Validity of the Test: Dunn (51:30) reported that alternate form reliability coefficients for the test were obtained by calculating Pearson product-moment correlations on raw scores for Forms A and B at each of 19 age levels. Correlations ranged from 0.67 to 0.84 with a median of 0.77. "The standard errors of measurement for I.Q. scores ranged from 6.00 to 8.61, the median being 7.20." (51:30) In the test manual details are given of previous research studies completed with different child populations. The coefficients very closely resemble those described for the standardization population. Much of the research on the PPVT has been conducted with retarded subjects, and coefficients of equivalence have been reported by Budoff and Purseglove (29) of 0.85 for institutionalized teenage retardates, by Dunn and Brooks (48) of 0.83 for educable retardates in special education classes in public schools, by Dunn and Harley (47) of 0.97 for cerebral-palsied children, and by Dunn and Hottell (49) of 0.84 for trainable retardates.

The extent to which the test measures what it purports to measure has been examined both for individual items and for the total test.

The author of the test claims that content validity:

> ". . . was built into the test when a complete search was made of Webster's New Collegiate Dictionary . . . for all words whose meanings could be depicted by a picture." (25:32)

Such content validity is important since the test purports to measure hearing vocabulary. However, since it was used in this project, and in many school-based and research situations, as a measure of verbal intelligence, the construct validity is important. Terman and Merrill have reported that the vocabulary test of the Revised Stanford-Binet Test of Intelligence is the most valuable single test in the scale. It is known that the vocabulary sub-test scores correlate more highly with the Full Scale I.Q. than any other sub-test, and it is been widely recognized that vocabulary is the best single item for predicting school success.

Although the verbal items of the PPVT, the Stanford-Binet, and the Wechsler tests do not measure identical verbal abilities (hearing vs. oral definition), they all measure the comprehension of the spoken word. In the language of the learning theorists, the method of decoding differs;

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[5] The example was constructed by the authors and was not a part of the particular test.

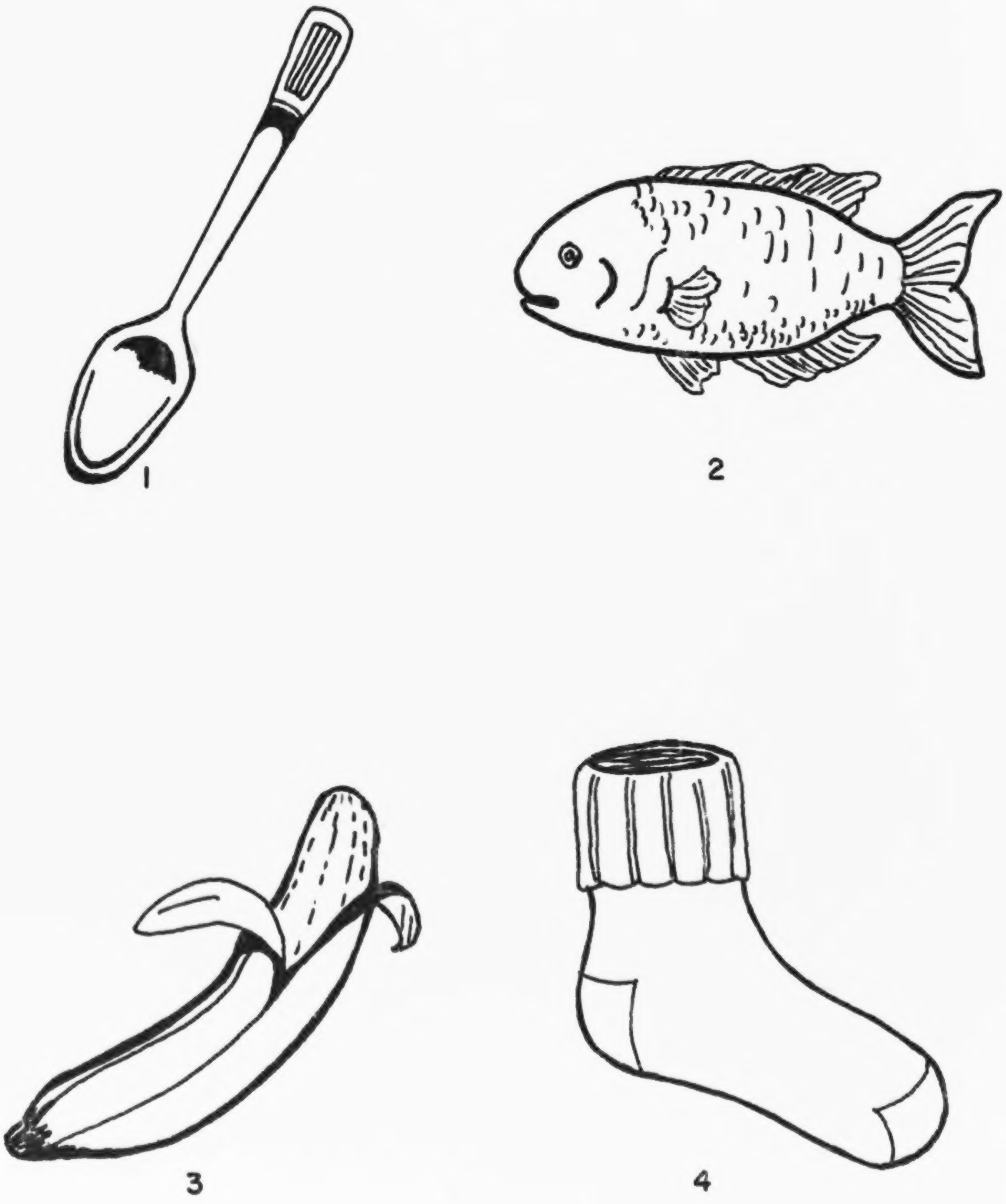

FIGURE 4. PEABODY PICTURE VOCABULARY TEST: A FICTITIOUS TEST PLATE

hearing vocabulary represents a restricted sample of verbal behavior.

The item validity was established by the author, by selecting words that demonstrated "linear, steep growth curves" (25:33)

> "Increase in raw scores with successive ages is indirect but not conclusive evidence of validity since physical growth, ossification, height, and weight also increase with age, yet are not highly related to verbal intelligence." (25:33)

Many studies show evidence of the statistical validity of the Peabody Picture Vocabulary Test. The degree to which the PPVT scores compare with the scores on other vocabulary and intelligence tests has been the subject of much study. PPVT mental age scores have correlated with the Binet mental ages scores from 0.60 to 0.87 with a median of 0.71, and with the verbal I.Q. of from 0.47 to 0.76, with a median of 0.84.

The Administration and scoring of the Test: The Psychological Inventories were administered to the children by the classroom teacher who had been informed of the appropriate test procedures during the in-service program. In general the data were secured prior to the commencement of the special treatment programs. However, with such a large number of time-consuming tests, some children did not complete the tests until the program was in progress. Some children needed to receive extra individual attention in order to complete the tests under conditions providing for optimal performance. Occasionally children were unable to take a test as planned because of their absences from school, and other children were placed in the classes during the early days of the project. All scoring was carried out by the investigators, according to the procedures outlined by Dunn (25).

Emotional Development

The emotional development of the children was assessed in two ways. First, questionnaires (38, 112) from the Cattell series were used to evaluate thirteen personality characteristics (see Table 5) and second, an assessment of the emotional difficulties for each child was obtained from the Bender test protocols.

The Personality Questionnaires

Test Description: The Early School Personality Questionnaire (38) (for the younger children), and the Children's Personality Questionnaire (112) (for the older children), are downward extensions of the Sixteen Personality Factor Test. Both instruments (38, 112), developed through factor analytic techniques, are designed to measure the major dimensions of human personality. The dimensions are each defined by two poles or extremes. The left side gives descriptions of low scores on the factor; the right side gives the high scores. With the exception of the intelligence factor (Factor B), high or low scores are not necessarily "good" or "bad" traits, although some characteristics are more

TABLE 5

THE LIST OF MEASURED PERSONALITY TRAITS USED TO MEASURE THE EMOTIONAL BEHAVIOR[1] OF THE CHILDREN

Factor	
A	PARTICIPATING
B	INTELLIGENT
C	EMOTIONALLY STABLE
D	IMPATIENT
E	INDEPENDENT
F	ENTHUSIASTIC
G	CONSCIENTIOUS
H	VENTURESOME
I	DEPENDENT
J	REFLECTIVE
N	CALCULATING
O	WORRYING
Q_4	TENSE

---

[1] The Emotional Indicators from the Bender Test protocol was also used to measure Emotional Behavior.

widely socially acceptable than others. Individuals or groups may take the test which has been previously used with educable retardates (114). A list of the thirteen common traits measured appears as Table 5.

Reliability and Validity: At the time of writing no reliability data have been published for the Early School Personality Questionnaire. The authors of the Children's Personality Questionnaire have reported several types of reliability coefficients for the fourteen factors. The test-retest, and the split half coefficients of reliability reported by Porter and Cattell (112) appear in Table 6.

> "The essential validity of a factor scale is determined by the extent to which the scale score correlates with the pure factor which it claims to measure." (112:12)

The concept validity of the C.P.Q. has been calculated in several ways by the authors. One method was to determine the extent to which the two halves of the test only have in common the factor each half attempts to measure. A second method by the multiple correlational technique; examining the relationship of the multiple r of all the items of each factor with the factor itself. Table 7 indicates the work of the authors in this respect.

The Administration and Scoring of the Tests: As for all psychological tests, the personality questionnaires were administered in the classrooms by the class teachers. Children were tested individually or in small groups, according to the procedures outlined in the test manual, and consistent with the characteristics of the class. Teachers were free to decide the best climate for testing, and hence no particular testing regimen was followed.

All inventories for the pre- and post-tests were scored according to the instructions contained in the test manual, by Mr. Robert James, a graduate student at the University of Wisconsin.

The Emotional Indicators

A Test Description

The Bender-Gestalt test has been fully described earlier in this chapter. However its use in this study to this point has been as an indicator of intellectual ability. Research has indicated that the test is valuable in the identification of children with emotional problems. Koppitz cites studies by Byrd, Clawson, Eber, and Simpson which showed that the test discriminates between well-adjusted and poorly-adjusted children. It was suggested by Simpson that:

> "Children with emotional problems do not differ from well-adjusted children in coordination and perception, but they reveal disturbances in the integration of the two, i.e., they show malfunctioning in visual-motor perception as a result of their emotional disturbance." (84:123)

TABLE 6

RELIABILITY COEFFICIENTS OF THE CHILDREN'S PERSONALITY QUESTIONNAIRE

Reliability Coefficients

Factor	Split-half Coefficient			Test-Retest Coefficient		
	Full length	Form A	Form B	Full length	Form A	Form B
A	.76	.72	.67	.75	.71	.60
B	.87	.86	.70	.79	.74	.73
C	.69	.70	.55	.52	.49	.51
D	.70	.58	.67	.64	.52	.58
E	.80	.79	.71	.71	.70	.50
F	.82	.77	.75	.75	.66	.66
G	.74	.64	.70	.65	.58	.61
H	.70	.66	.65	.64	.55	.63
I	.86	.85	.76	.73	.70	.58
J	.63	.58	.66	.55	.48	.50
N	.82	.71	.70	.83	.62	.61
O	.66	.63	.59	.66	.59	.56
Q_4	.78	.65	.74	.69	.53	.59

TABLE 7

CONCEPT VALIDITY COEFFICIENTS OF THE
CHILDREN'S PERSONALITY QUESTIONNAIRE

	Validity Coefficients		
	Multiple r from items	Equivalence	
Factor	Full Scale	One Form	Full Scale
A	.68	.63	.76
B	.83	.67	.77
C	.55	.46	.59
D	.82	.69	.80
E	.72	.57	.70
F	.69	.60	.73
G	.71	.55	.68
H	.82	.57	.71
I	.84	.71	.82
J	.53	.44	.56
N	.70	.67	.77
O	.77	.62	.75
Q4	.76	.75	.77

In constructing a scale of emotional indicators the deviations and distortions examined indicate an immature visual-motor perception. The manner in which the drawings are produced by a child, for example, their size, placement, are emotional indicators "which are primarily related to personality factors and attitudes." (84:124). The ten emotional indicators defined and scored for children are:

1. Confused order.
2. Wavy line in Figures 1 and 2
3. Dashes for circles in Figure 2.
4. Progressive increase in size in Figures 1, 2 and 3.
5. Large size of drawings.
6. Small size of drawings.
7. Fine line.
8. Overwork, reinforced lines.
9. Second attempt.
10. Expansion.

The Reliability and Validity of the Test: Details of the reliability of the Bender Test have been given earlier in this chapter. The reliabilities indicate a high degree of reliability, bearing in mind that on a retest basis some items are related to chronological age. Insofar that the total protocol reliabilities have been satisfactory, it was assumed that the deviations and distortions were likely to be repeated.

Face validity is claimed for the emotional indicators, subject to the experience of the protocol interpreter. Koppitz presents evidence that children with known emotional problems also tend to have immature visual-motor perception in that they have poor Developmental Bender scores. The indicators were derived by both research and clinical experience. Analyzing the protocols both in terms of individual indicators and the total number of emotional indicators on a protocol, it has been demonstrated that both have worth.

Test Administration and Protocol Interpretation: Details of the administration and scoring of the test are described earlier in the chapter.

Social Behavior

Sociometry

A Description of the Test: A sociometric test was administered to each child at the beginning, and at the conclusion of the project.

Six questions involved:

1. Prefer to have on a team for physical activity.
2. Prefer not to have on a team for physical activity.
3. Prefer to sit next to in class.
4. Prefer not to sit next to in class.
5. Prefer to work with in class.
6. Prefer not to work with in class.

It was felt that the questions were meaningful to the children because everyday situations were involved. In one or two instances it was reported by teachers of, for example, the very young classes of children with limited intellectual ability and school experience, that the occasion occurred when further verbal explanation was needed in order to elicit responses from the child. Insofar as the teachers were those most capable of eliciting appropriate test responses, and of providing satisfactory testing conditions, these instances were felt to help the testing procedures rather than cause discrepancies.

The sociometric procedure was employed to evaluate the feelings of the children in a class toward each other. Although the use of sociometric techniques has increased in research, in relation to sophistication and frequency, the instrument was used in this study in only a limited manner, to see how the children were accepted and rejected by the others in the class. This was undertaken so that any differences which might occur during the study could be noted and measured and tested statistically. Thus no graphic or diagramatic structural representation was included in the report.

An index of ACCEPTANCE, and an index of REJECTION, similar to that explained by Gronlund was used. Comparisons between groups was used and adjustments for group size were made. According to the comments and recommendations of Oliver (108) regarding the sociometric criterion, unlimited responses were allowed. Results for the three "choice" questions were pooled to form the basis for the calculation of an acceptance score, and similar procedures occurred with respect to the "rejection" questions.

The Reliability and Validity of the Test: Whilst the meaning of sociometric data depends to some extent upon the degree of constancy of the scores, the very nature of the dynamic interations occurring within a group of children indicates that variations do occur. These two somewhat conflicting requirements are characteristic of many psychological tests.

Several methods of determining the reliability of sociometric data have been used. Of relevance to this study was the examination of the internal consistency of the test, using the split-half method, and the degree to which test-retest reliability exists.

Ausubel, Schiff and Gasser (65) made extensive use of the split-half method in examining the degree to which internal consistency in sociometric ratings occurred in five different grade levels. Coefficients of correlation were from 0.54 to 0.86 for elementary and junior high school students, and 0.89 to 0.90 for groups of high school students. Bass and White have confirmed these relationships at the college level (104).

Much research has been undertaken in the determining of the reliability of sociometric data when a time interval has occurred between the two administrations of the test. In general the stability of results has been demonstrated to increase with the age of the subjects. Bronfenbrenner (28) reported a coefficient of 0.27 for children in nursery school over a seven-month period (N = 14), and of 0.67 for kindergarten pupils over the same length of time (N = 20). Three choices of each of three criteria were used.

> "It is apparent . . . that even among young children the sociometric status of individuals is fairly stable over a period of months. Those that are highly chosen by the group tend to remain highly chosen and those with low group acceptance tend to remain in that category" (65;123).

Many studies have been concerned with elementary school children. The time intervals has greatly varied, but in studies by Bryd, using unlimited number of choices with a two-menth interval, when fourth grade pupils chose fellow actors in a play, and Gronlund (65) for fourth to sixth grade classes over a four-month span, reported coefficients of 0.89 and 0.75.

The most elaborate study by Bonney (23) is most relevant to this report. Over a four-year period a sociometric test was administered to a group of second grade children (N = 48), and then repeated at intervals of one year as the group progressed in the school. A composite score for sociometric status was correlated with the ratings between each grade level and coefficients ranging from 0.67 to 0.84 were reported for the grade levels. Over the same period of time, coefficients from intelligence tests ranged from 0.75 to 0.86 and from 0.60 to 0.83 for achievement tests. In this study the relatively high degree of stability of sociometric status was demonstrated.

Gronlund, in an assessment of the influence of the number of choices, concluded that the fewer choices allowed the children, the lower the resultant reliabilities (65;149).

In using the sociometric technique six questions were asked of each pupil, during an individual test. Insofar as the questions asked for preferences or choices, validity of the test is self-evident.

The test was included to obtain a measure of social adjustment for each child in each class. Social adjustment is the degree to which the individuals are accepted by their classroom peers, and therefore a frequently chosen person (well accepted by the others in the class) is relatively well socially adjusted.

Test Administration and Scoring: The test was administered individually to the children who were asked to verbally respond to each of the six questions. In each case the positive (choosing) form of the question was asked before the negative (rejecting) form of the same question.

Every attempt was made by the class teacher to provide the necessary atmosphere of secrecy which was deemed necessary to honest answers, and the pupils were made aware that they had an unlimited number of choices/rejections. Choices were, however, restricted to the members of the child's own class.

All scoring was done at the University of Wisconsin by Mr. Ben J. Lowe. The data from the six questions were treated in two parts. First the data from the three "positive" questions was pooled to provide an ACCEPTANCE score for each child, i.e., how often could he have been chosen, and the data from three "negative" questions was used to provide a REJECTION score for each child. Thus adjustments were made which allowed for the differences which occurred in class size.

Cowell Social Behavior Trend Index

Description: An objective of physical education is social adjustment and socialization by means of games, sports and other physical activities.

This test was originally designed to be used to evaluate such qualities in high school boys. Through factor analytic techniques, ten behavior trend dichotomous pairs of "word pictures" were found to represent an adjustment syndrome (a group of symptoms occurring together). The ten "positive" word pictures represent good adjustment, and the ten "negative" word pictures represent poor adjustment. Table 8 shows form A of this test, and the indication to the teacher of how to mark the protocol.

The Reliability and Validity of the Test: It has been earlier noted that the age and level of intellectual ability of many of the children precluded the use of all but a small number of tests. An evaluation of the social behavior of the children was difficult and hence the main reasons for using the Cowell Index as a measure of social behavior were that the test seemed appropriate, and that it had previously been used successfully in a nationwide study of the environmental factors which are associated with the motor performance and physical fitness of educable mentally retarded children (121). Previous evidence concerning satisfactory reliability and validity of the test for exceptional children is not available in the literature. The results presented in this study must, therefore, be at best tentative.

Essentially the question of test reliability centers around the nature of the response elicited in the observer (the teacher); by the dichotomous

TABLE 8

COWELL SOCIAL BEHAVIOR TREND INDEX: FORM A

Last Name First Name

School

Teacher

INSTRUCTIONS: Think carefully of the student's behavior in group situations and check each behavior trend according to its degree of descriptiveness.

Behavior Trend	Descriptive of the Student			
	Markedly	Somewhat	Only slightly	at all
1. Enters heartily and with enjoyment into the spirit of social intercourse.				
2. Frank, talkative and sociable, does not stand on ceremony.				
3. Self-confident and self-reliant, tends to take success for granted, strong initiative, likes to lead.				
4. Quick and decisive in movement, pronounced or excessive energy.				
5. Prefers group activities, work or play; not easily satisfied with individual projects.				
6. Adaptable to new situations, makes adjustments readily, welcomes change.				
7. Is self-composed, seldom shows signs of embarrassment.				
8. Tends to elation of spirits, seldom gloomy or moody.				
9. Seeks a broad range of friendships, not selective or exclusive in games and the like.				
10. Hearty and cordial, even to strangers, forms acquaintanceships very easily.				

pairs of word pictures:

> "The reliability of the observers and the extent to which the negative behavior trend items were true opposites of the positive items was indicated by a permutation reliability coefficient of -.82, indicating that when observers said that a certain positive behavior trend was 'markedly descriptive' of the subject, they tended to regard its negative opposite as 'not at all descriptive of a given subject'." (42:8)

Using data from a nationwide project Widdop was able to show that:

> ". . . for both sexes across all ages, a positive relationship existed between behavior and test performance for almost every item. This was not entirely unexpected, as the behavior trend stresses a positive attitude regarding sociability, confidence, ability to adapt, and decisiveness. In other words, it stresses the extrovertial attitude usually associated with physical ability." (144:122)

The internal consistency (internal validity) of the instrument has been reported by Cowell:

> ". . . the correlations between the total resultant scores for each trend were calculated for the positive and negative angles." (42:8)

Using the Thurstone Method of factor analytic technique the ten word picture pairs (form A and form B of the test) represented an adjustment syndrome (a group of symptoms occurring together) indicating that a single factor seemed to be accounting for the observed intercorrelations.

> "The results of the correlation of each item with the general adjustment factor indicate that behavior trends retained can be considered rather as common denominators underlying good or poor adjustment, according to sign (plus or minus)." (42:8)

The Administrationand Scoring of the Test: The class teacher completed a copy of form A of the test for each child in their class, prior to and at the end of the project. All tests were scored by the investigators.

Additional Data Collected

Data from Individual Record Files

Date of Birth: The date of birth for each child was recorded, withpermission, from the files of the Special Services Departments of the three school districts.

Intelligence Quotient: The measured intelligence of each child was recorded in like manner to thedate of birth.

In most cases the test used was the Wechsler Intelligence Scale for Children on the Stanford-Binet Test. No attempt was made to note the individual test that a particular child completed. Several variables were uncontrolled; for example the date of the test and the test procedures used.

Height: The height of each child was recorded to the nearest ½ inch, at the beginning and conclusion of the project. The school nursing staff were responsible for taking the measurements.

Weight: The weight of each child was recorded to the nearest pound, at the beginning and conclusion of the project. The school nursing staff were responsible for taking the measurements.

In-Service Training of Teachers

Prior to the testing and teaching programs several meetings were held to train the teachers in the necessary procedures. All meetings were held in the Administration Building of the Pasadena Independent School District.

It has been previously explained that few schools in this country are staffed with fully qualified physical education teachers at the elementary level. This is true also of the schools in the three districts and hence the opportunity for children in special education to participate in physical education lessons is extremely limited. Thus, it was evident that the experimental programs would have to be taught by classroom teachers. One advantage of this procedure was that rapport already existed between the teacher and the children in the class. Many teachers were excited about the possibilities afforded by the research, but few were experienced in handling physical education or art programs, and therefore in-service teacher training which would be supplemented by the help of a supervisor during the program was very important.

An equally important aspect of the meeting related to the use of the tests which had been selected to assess behavioral changes of the children. Careful instruction on the aims and methods of the testing program was important if the results of the research were to be worthwhile and meaningful.

At the first meeting all the teachers were present. Also in attendance were school principals, deputy principals, Directors of Special Services, Directors of Physical Education and Athletics, and other members of the administration.

The meeting consisted of several phases:

A complete overview of the project was presented; namely, what it was, why it was being carried out, and how it would be carried out.

Procedures for the administration of the psychological tests were given.

Procedures for the administration of the motor performance test items were given.

Other general arrangements were discussed.

Questions and answers took place.

Control teachers met.

Other meetings were held at which only the administration and teachers concerned with a particular teaching program were present. Thus the meetings were essentially for:

Teachers of the Art Program.

Teachers of the Individualized Physical Education Program.

Teachers of the Group Oriented Physical Education Program.

Discussion took place onthe teaching programs and ways of presenting the material to the children. Each teacher was given a teaching manual which included details of:

The aims and objectives of the program.

Ways of demonstration and observation.

Source materials.

When to teach particular types of work.

Other meetings with individual teachers or with groups of teachers took place frequently during the program and before the second period of testing.

All teachers received remuneration for the time spent at the evening in-service meetings, which were thought to be over and above the duties which could be expected from them. These meetings occurred on every evening for one week; further meetings took place during the early stages of the programs.

Throughout the period of the programs the program supervisor travelled around the schools visiting classes, observing the teachers teach; observing the children in the ways they reacted to the presentation of the teaching materials, talking with the teachers, and teaching part or whole lessons. The demonstration teaching was done for several reasons:

To allow the teachers to see their class at work.

To indicate to the teachers how the teaching could proceed.

To indicate to the teachers how teaching material could be handled in different ways, and how material could be developed.

A schedule was drawn up so that it was possible to observe (with few exceptions), each teacher each week. Changes in this schedule were made when any difficulty needed immediate attention. One such difficulty related to the quality of the teaching, whilst a second was concerned with equipment. In spite of the uncertainty with the expectations of the teaching programs (largely because of their untried nature with these EMR and MBI children), and the differences in the characteristics of the teachers and the children, it was evident that as the program developed that differences in the quality of the teaching existed. Thus an extra effort was needed to ensure that all the teaching was effective, and that it was proceeding along lines which were consistent with the aims of the project and with good teaching technique.

Additional excellent support was given at all times by the school district administrative staff and the school principals.

The Teaching Environment

Physical Education Programs

It was originally intended to carry on all the teaching out-of-doors, as each school had large grassed areas adjacent to the physical plant. In addition it was judged that the weather in the Gulf Coast area of south Texas would allow this work to continue without interruption, during the whole 20 weeks of the teaching program.

Essentially the teaching did take place out-of-doors. Exceptions occurred occasionally because of cold and/or wet weather. On certain occasions heavy rains made work out-of-doors impracticable since the children did not wear a change of clothes for the special programs. On other occasions the weather was thought to be too cold for the children--especially the very young children, for whom the rapid temperature changes of the Houston area weather meant that even a temperature of, for example, 50° felt cold.

When outdoor work was not practicable the work took place either in the classroom or in an auditorium or gymnasium. The choice of indoor teaching area rested largely upon the size of class (range 6-16 in number), and the facilities of the respective schools.

At frequent points throughout the program, questions were asked concerning the use of space, for these children, particularly the minimally brain-injured, who are usually reported to have difficulties with spatial relationships. This will be discussed in the results section of this study.

The Art Program

All the work for this program took place within the classroom. Classrooms were well lighted, and well equipped, and provided ample working space for the program to be satisfactorily completed.

The Experimental Programs

Introduction

In this project the degree to which it was utlimately possible to provide meaningful information in relation to the questions asked in Chapter One, depended upon at least two very important factors:

The quality of the experimental programs.

The sophistication of the instruments of evaluation.

The study was designed to answer the basic question of the effects of different types of programs (in particular physical education programs) on the motor, strength, intellectual, social, and emotional behavior of the participating classes of children. Earlier mention was made of the difficulty in finding appropriate instruments of evaluation for young children of limited intellectual ability. If changes in the behavior of the children occurred it was a point to ponder whether such changes could be detected by the tests. Likewise, whatever changes occurred should be attributable to the experimental treatment which could itself be clearly described. Thus, it was necessary to design programs which were different, which could be kept different (being seen as different by the teachers and program supervisor) and which could reasonably be expected to elicit different effects, or at least effects which differed according to the particular parameter of development being examined. For example, the special experimental classes were to have realized that "something special" was occurring, just as the other classes were not to have been aware that they too were involved in the project.

The realization on the part of the subjects that they were involved in a special project, was important. Only Oliver, the writer of the paper which elicited such intense interest in the possibilities which physical education programs afforded to educationally sub-normal children, stresses the emotional involvement of the subjects in their special program. To Oliver (107) the importance of the project was in this aspect of the work and not in the activities themselves. The basis for positive modifications in the behavior of the boys was the successful experiences afforded by the program which "happened" to be a physical activity program. Nevertheless the programs had to be of unquestionable quality, which could be supported by those in physical education and which were appropriate to the needs and characteristics of the children.

A second point made by Oliver was that whilst educational programs (special treatment) must be clearly described so that the research can be replicated, replications of this type of work were hardly possible since it was the whole background experience and philosophies of those involved in carrying through the project, which made an indelible stamp on educational research.

Thus, the art program was to involve the children in those particular classes just as much as the other programs. It was the particular orientation of the programs (not the quality) which was different.

It was decided to inform all the teachers of the characteristics of each program, and to stress to them the differences. The importance of the "control" group classes was stressed to all teachers in order to maintain their confidence and cooperation.

Rationale for the Experimental Treatments

Prior to entering school, children have been exposed to a multitude of experiences--many of them involving movement. In theory then, children in general can be expected to be well experienced in movement. Some children do indeed have a rich background of movement experience but others have only limited opportunity for developing this aspect of their lives, and in practice cannot perform even the basic motor skill patterns that are expected of them. If a child's potential in movement is to be developed, then a multitude of such experiences should help achieve this; with guidance, children discover that they can do many more things than they thought they could do and thus be helped to live more successful lives within the school and home environments. Basic to such a philosophy is the premise that motor development is dependent upon experiences so numerous that all possible movement patterns should be given to children in organized physical education lessons. Basic movements such as walking, running, jumping and landing can be introduced so that a boy experiences, for example, as many ways of running as he can manage or the teacher can guide him through.

The rationale for the use of the individualized approach rests upon the belief held by some that mentally retarded children and brain-injured children need to have the security of working individually at their own level where the disturbing and perhaps distractive influences of their peers is at a minimum--where the tensions and frustrations of invideous comparisons and competition for peer status are practically non-existent. Others suggest that the traumatic effects of group interaction in motor skill development for these children are not great, and that the social values resulting from group play far outweigh their possible negative influences on skill learning. Thus there is also logical support for the group-oriented program too.

Since a primary purpose of the physical education instructional program is to help children become reasonably proficient in the motor activities of our culture and at the same time develop desirable patterns of social behavior, an investigation of the influence of programs with these two distinct types of orientation seems to be desirable and worthwhile. To deprive one group of children from social interaction within the physical education program did not appear detrimental since at all other times of the day there was the opportunity for social communication.

The types of teaching material to be presented to the children were to be geared towards their age, aptitudes and abilities. Few would question that these children want and need to improve their motor proficiency; physical activity provides children with goals that are relatively easily seen. The conditions under which these children can most effectively acquire desirable behaviors (motor and otherwise) have not yet been identified but it is generally recognized that the setting in which the learning takes place is highly important. The attention which is given by the teacher to the individuals in a class, and the interaction which occurs within the teaching-learning experiences afforded is most important. The oft-mentioned expectation of failure in the retarded may be a critical factor in the acquisition of skill development in the group learning situation. Under an individual type activity program, the child serves as his own norm, competing solely against his own previous performance, without the anxiety which might occur in group situations.

The Art program was designed specifically to control for the possible existence of the Hawthorne effect (39). Insofar as modifications in behavior were to occur which could be attributed to the special nature of the experimental treatment, they could be accurately measured.

Just as the two physical education programs involved gross motor activity, so the Art program was designed as a special program, likely theoretically to elicit positive, desirable behavioral modifications, but which was devoid of the use of the big muscle groups in the continual involvement of the body in space. The basic aims of the programs were similar, and equal attention was devoted to the supervision of all experimental treatments. A list of the art supplies has been included later in this chapter.

A word of explanation is in order at this point. At no time during the experimental programs were any test items included. Hence, the children did not practice the tests, nor was instruction given in the execution of any test item. A deliberate attempt was made to avoid this type of contamination.

Individualized Physical Education Programs

Aims of the Program

The aims of the individualized physical education program were consistent with many such activity programs for young children, and were:

To satisfy the need for movement.

To provide an enjoyable variety of successfully performed movement experiences.

To provide for the need for repetition of movements and for individual improvements in performance.

To encourage good postural habits.

To teach elementary everyday physical skills.

To contribute to the education of the whole child.

Program Description[7]

For approximately thirty-five minutes each day, for twenty teaching weeks, classes had specially planned physical education lessons. Within each classroom group, all work took place with the child working by himself, at his own level of ability, but still within the limitations of the task used by the teacher. Thus, both the social organization of the group of children, and the way in which physical tasks were accomplished by each child indicated and validated the individualized nature of the program.

Movement patterns were used by themselves (for example, a variety of jumping experiences), and together (sequence work involving the joining of movements from different patterns, for example, run, jump, land, roll and balance). Through the introduction of the concepts of time, space, force, and flow, and their application in movement experiences, a wide range of movements was experienced by each child. The central focus was upon improving the child's proficiency in such movement patterns as running, walking, jumping, landing, etc., progressing systematically from the simple to the more complex. All activity was graded to each child's level of proficiency.

Sequence work was seen as being a progression of the earlier work. The conceptual bases of movement were continually stressed, and a knowledge of what was occurring was transmitted to the children. Child activity was the basic ingredient of the program but it was not sufficient for the children to simply experience these movements, for it was stressed that they should understand (and be able to communicate) much of what was involved. This point was very important in all aspects of each experimental program since the children were being educated (not trained); the challenge that the lesson presented to the class was not only in terms of purposeful, worthwhile, stimulating activity but also that it was continual challenge to the processes of the mind. The concomitant learnings associated with the programs were carefully planned, and not allowed to occur haphazardly. Neither were the opportunities for such learnings to be bypassed. In all types of work the vocabulary used by the teacher was very important not only in achieving action on the part of the children but in challenging the children intellectually.

Since it was well known that the level of motor performance of special education children was considerably lower than that of children in regular classes, this work may have been described as remedial. There is much support for the idea of giving children basic movements as an educational program because the method takes the children where they are, and is geared not to the demands of society but to the needs and abilities of the children themselves.

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[7] Appendix A indicates more specific examples of the work than have been included in this section of the report.

Blocks of Work

Introduction: This phase was adopted to denote the type and orientation of work that it was suggested could be undertaken within a given period of time. There was great flexibility in the way or extent to which the timetable was adhered to, and the work for an individual class was frequently discussed by the supervisor and the classroom teacher. An outline was supplied to provide a frame of constant reference.

An attempt was made to have the physical education lessons follow a particular "form," rather than be simply a conglomeration of unrelated pieces. Since these were classroom teachers interested but not practiced in teaching physical education lessons, it was suggested that, in general, lessons should exhibit the following pattern:

Introductory Activities

Main Activities

Closing Activities

That the lessons commenced without delay was of extreme import. Instructions for the introductory activities were given to the children before they left the classroom, "When you reach the field (any designated teaching area), find your own space and show me how many different ways you can . . ." (An example for the group program might have included the phase, ". . . join with a partner your own size, and see if each of you can . . ."). The lessons started with the children moving rather than the teacher explaining.

For this program, the introductory activities were a new activity, later to be developed in the main section of the lesson, or a repetition or further practice of an activity previously used. The main section of the lesson, also the longest in time, was usually devoted in introducing new movement ideas or developing in a different situation, a previously learned activity. The last section of the lesson, which lasted only a few moments, was frequently used for an activity that was well-known and liked by the class.

The outlines of work were guides only. Teachers were free to choose which activities to include in relation to the age, ability, particular behavioral characteristics and previous reactions of the class. It was important to include something new and also to repeat something during each lesson. The frequent introduction of apparatus in the lessons greatly motivated the children.

Program Description: Walking and running - The first week* of work was devoted to a wide variety of walking and running movements. Differences in speed, direction and pattern were developed.

*Any particular reference to a period of time was used by the teachers purely as a guide—as an approximation of time. It was not taken literally.

Running and jumping - Earlier work in running was repeated, and the idea of style was introduced. Work on jumping was commenced with an emphasis upon differences in the type of jump.

Jumping and landing - Previous running and jumping activities were repeated, and a wide range of activities was experienced by each child. "Landing" was taught as a specific skill, and then the experience of landing was developed through the introduction of many running, jumping and landing tasks. Elementary sequence work (a number of activities joined together into one activity having a beginning and an ending point) was developed by adding work on balance at the end of the sequence. The idea of balance was one of no motion. Different ways of joining a walk, a run, a jump, a land and a balance were explored, and several sequences were included to be practiced and perfected. Repetition of the same movements was considered very important; just as important as the pursuit of a wide variety of different movements.

Rocking and rolling - Individual mats, measuring 72" x 24" x 1½" were provided for each child, and a wide variety of rolling and rocking movements were achieved by the children. Elementary sequence work which included such movements was attempted.

Small apparatus - Although small apparatus had been used, though sparingly, in previous lessons, its use was secondary to the main purpose of expanding the child's vocabulary of movement; now the apparatus was the main focus. A list of apparatus appears later in this chapter. Special emphasis was given to work with large and small balls. The specific skills of throwing and catching were taught.

Small apparatus - Other items of the apparatus, the hoops, ropes, and mats were used on their own account, and also to help the child build upon the previously presented work in running, jumping and landing, rolling, rocking and balancing movements.

Repetition - Prior to the Christmas holidays several lessons were used to repeat those activities or types of work which were felt to have been most liked by the class, and which appeared to the teacher to have been most worthwhile for the class.

These seven blocks of work covered an eleven-week session of teaching.

For approximately a week the work was of two types. A great deal of work was accomplished of a recapitulatory nature. Walking and running movements were developed with regard to direction, speed, space and form (style). The ball-handling skills of bouncing, catching, throwing, rolling were developed both in terms of variety of movement, and in the ability of each child to perform well.

As in most lessons some running and jumping work was included. A special emphasis was placed upon work on the mats, using rolling, rocking, stretched and curled, twisting and turning movements. An attempt was made to develop these movements to as great an extent as possible. At the beginning and/or end of each lesson the large and small balls were used and moving the ball with the feet was attempted. Again, as with all work, a variety of movements was the aim.

The major portion of the work for the next week entailed weight-bearing activities. At the beginning and (or end of the lessons), the hoops and ropes were used to develop the work started before Christmas.

The content of the lessons for the next week was of two types. First the specific skills of handstand, handwalk, cartwheel, crab and headstand were introduced to all children. At the beginning and/or end of each lesson all the work entailed the use of apparatus.

The most difficult work was developed during the last weeks of the project; sequence work. A sequence was defined as "a number of activities joined together to form a single activity, having a beginning and an ending point." A section of TASKS was included in the manual, but the teachers were encouraged to allow the children to explore and experiment with this type of work, combining movements of their own choosing into sequences. In addition to encouraging a variety of sequences to be accomplished by each child, there was stressed the important need for sequences to be repeated--"try to repeat your sequence so that you can show the class what you were doing." By repeating a sequence, the quality of the children's work should improve. The aim was to develop the child's understanding of what his body has done (let him describe it and then demonstrate it).

Group Oriented Physical Education Program

Aims of the Program

The general aims of the group oriented physical education program were consistent with many such activity programs for young children, and were listed in a previous section of this chapter.

Program Description[8]

For approximately thirty-five minutes each day, for twenty teaching weeks, classes had specially planned physical education lessons. Within each classroom group, all work took place with the child working with a partner, or as a member of a small group. Thus the child always worked in cooperation or in competition with the other members of the class. The partner and small group physical activities involved movement examples and patterns as in treatment 1, and the conceptual use of time, space, force and flow was continually stressed, but always in relation to a partner or to the group. Partners or group composition changed frequently; there was a free interchange of children, but the type of activities undertaken was watched carefully. For example, a small boy was purposely matched with a tall strong boy in a partner activity, but in such a situation the qualities of height and strength were not part of the competition; instead the boys were involved in an activity like Chinese sit-ups—an activity involving cooperation. Likewise in activities where boys and girls were in groups together the task was carefully chosen so that the children could cooperate.

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[8] Appendix B indicates more specific examples of the work than have been included in this section of the report.

Within each type of group activity the work began at a very simple level and progressed in its complexity as the program advanced. Such progression considered the skill level of the children, the amount of organization that was involved for the teacher to manage, and for the children to understand. In this way it was possible to provide the children with a very large number of activities which were challenging, geared to their level of ability and appropriate for their chronological age. In both experimental physical education programs, the types of activities to be presented to the children were included in a teaching manual, the content of which was frequently discussed by the teachers and the supervisor of the teaching program.

Blocks of Work

Introduction: The rationale and description of this concept has been discussed elsewhere in this chapter.

Description: Class, partner and relay work - For approximately the first week of the project, work was completed on each of the three aspects. The simple class and partner activities were to be taught, and the basic "straight" relays were also accomplished. The aim was for the teacher and class to become familiar with organizing that particular type of work. At the same time a repertoire of material was being built, around which further repetition, practice and development (including the use of apparatus) could take place.

Development - During the second week of the project the aim was to introduce new activities and also to repeat some of the previously used activities but this time using a limited amount of small apparatus.

The lesson pattern - By using previously introduced activities, the aim was to establish good lesson form, using appropriate introductory and closing activities as well as the activity or activities which constituted the main section of the lesson.

New activities - Over a two-week period most of each lesson was spent introducing NEW activities. Only during the brief period at the beginning of each lesson were previously used activities introduced. Circle and go touch relays were suggested.

Partner activities - The start and final moments of each lesson were used for repeating activities already known to the children. In the main section of the lesson NEW partner activities—with or without apparatus—were introduced to the class.

Apparatus - For a two-week period the work in the main section of the lessons involved the use of apparatus. Much use was made of the large and small balls (1 ball between 2 or more children). For the other two sections of each lesson, previously used activities were taught; activities which did not entail the use of the apparatus.

Class and relay activities - For several days some new class activities and relays were introduced. A full lesson of relays proved very exhilarating, and by using a block of time for each type of activity, relays and class activities could be both manipulated and developed.

Recapitulation - For several days before the Christmas holiday, only those activities which the teacher felt had been most liked by the class, and which were thought to have been most beneficial were used. Such activities were class, partner, and/or relay, and may or may not have involved apparatus. The use of the correct lesson plan was stressed.

The work for the first two weeks after the Christmas vacation was of a recapitulatory nature. New activities were not used during this period of time. The main emphasis was upon improving the quality of all the work performed, and at the same time firmly establishing the pattern of teaching (lesson form).

For approximately one week the work was completed totally with the use of the apparatus. For example, all the work for one day might have been with the hoops. Mats, hoops, balls and ropes could have been used in the same lesson on the last day of the week. The correct lesson form was retained and a high quality of student effort and quality of work was always demanded. Some "new" and some "old" activities were used.

Keeping the major purposes of the project in mind, the work for the next three weeks involved primarily new activities in each section of the work.

For the final three-week period of the project the teachers aimed at:

Continued correct lesson form.

A great amount of physical movement by each child during every lesson.

Improving the actual standard of performance of each child in respect to:

Compliance with rules and instruction,
Improving the quality of movement,
Extending the understandings of the child in relation to what was being done, how it was being done, and why it was being done.

Using a wide variety of activities from each section of the manual. Apparatus was to be frequently used.

Art Program

Aims of the Project

The aims of the art program were:

To satisfy the need for creative activities.

To provide an enjoyable variety of successfully performed creative experiences in which a feeling for color, pattern, texture, etc., were developed.

To provide for the need for projects to be repeated and individual improvements in performance.

To encourage good work habits.

To teach elementary everyday manual skills.

To contribute to the education of the whole child.

Program Description[9]

For approximately thirty-five minutes each day, for twenty teaching weeks, classes had specially planned and guided Art Education lessons. The children worked at a variety of types of work, in developing a feeling for color, shape, texture, size and perspective, through the opportunity to express themselves freely in a wide variety of easily accessible materials. The work took the form of individual projects, and these included amongst others, clay modeling, letter designs, drawings, finger painting, the construction of mobiles, and potato painting. There was a variety of working media.

This special treatment was included to specifically control for the possible existence of the Hawthorne effect (39).

In general, the teaching material was divided into four types:

Painting

Pasting

Paper-Cutting

Construction Work

It was considered that each type of work was basically more difficult, more demanding, and needed greater background and experience than the previous type. Thus progressions occurred within each section and between sections.

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[9] Appendix C indicates more specific examples of the work than have been included in this section of the report.

Blocks of Work

Introduction: The rationale and description of this concept has been discussed elsewhere in this chapter.

Description: For approximately two weeks, all work consisted of painting and pasting. From each of Sections A and B in the manual, the earliest (simplest) examples were used.

During this two-week period most of the work was taken from Section C (paper cutting), with lesser amounts from the painting and pasting sections. Some of the work from those two sections was new, and some was of a repetitive nature.

This was the week of Halloween, and a variety of suitable Halloween topics were completed.

This two-week block of work consisted of equal amounts of work from all sections (painting, pasting, paper cutting, and construction work). Only activities that had not previously been used were employed.

During the week of Thanksgiving, many suitable seasonal topics were used.

For this week, some of the topics previously used, which the teacher felt were most liked by the class, and which appeared to have been most worthwhile were employed.

Prior to the Christmas holiday, suitable seasonal topics were completed.

After Christmas, developments occurred in line with the progressions previously suggested. The main development was in stressing that creativity and precision in art work should both be attempted.

Usual Classroom Instructional Program

The classes in this program, though involved in the pre-test and the post-tests were not aware that they were participants in a special study. They followed their usual instructional program, receiving no special treatment nor any planned physical education or art programs.

Other Teaching Strategies

Discussion

Because of the individual differences which occur in children in a class, and because many factors affect the way children perform, it is possible only to generalize in describing the work accomplished by the thirty-six classes of children. Although random procedures were employed to assign a class of children (disability x age) into a particular experimental program, some differences were noted between the classes. The attempt was to provide a program that was always appropriate to the demands of the research design, and to the behavioral needs and characteristics of the children. In that the children within even one class differed markedly in the various parameters of development, the description of the work undertaken by the classes can be only in general terms.

A booklet was provided for each teacher, in which were included the aims of the particular program, descriptions of the types of work involved in the program, and a structured outline which suggested the work that might be attempted within a period of time. This manual (it has been stressed many times) was a guide only. It was issued to the teachers after some instruction, at in-service meetings, had been given; and it was constantly supplemented by interaction between teacher and program supervisor. The importance of having the cooperation of the principals of the schools, and those in administrative positions must be emphasized. Research projects of this type could not begin to function without the cooperation which permeated every level of the school districts.

Interim Teaching Suggestions

The manual provided for the teachers was replaced at the Christmas holiday period, but a second manual in which extra teaching material and other observations and guidelines were included, was provided.

Three points were stressed:

a. The importance of establishing LESSON FORM

Although most teachers were teaching "well-rounded" physical education lessons, it was thought necessary to recapitulate that it was essential to establish the habit of having each lesson start and end in an appropriate way. The use of three sections of work was important, and many teachers had found it worthwhile to describe the introductory work to the children before leaving the classroom. This technique was consistent with the idea of having the children active immediately the lesson commenced. In order to gain immediate, worthwhile activity, walking, running or rolling activities, or activities with a partner or using small apparatus were suggested. The first portion of the lesson needed to last only a few minutes.

For the guidance of the teachers it was suggested that the major portion of the work of each lesson would generally evolve around just one type of activity. During this section of the lesson the work was to be developed to as full an extent as was possible, for it was stressed that it was not sufficient merely to have the children "going through the motions." In order to accomplish this, a very detailed knowledge and understanding of the material in the main section of the manual, and a good understanding of the ways to manipulate material, and use of child demonstration and observation was needed.

The efficient utilization of teaching time was stressed especially in respect to the timing of the introduction of teaching points. Bearing in mind the relatively low standard of fitness of these children it was likely that the children needed some moments within the lessons in order to regain their breath (for example, after a prolonged bout of vigorous activity). These seconds were to be most valuable in the lesson for questions such as "What did you notice about the way these two children were working?" or "Why did it take the catcher so long to . . .?" could be used to elicit a much greater understanding by the children of what they were doing.

The closing moments of the lesson were used for a separate activity; perhaps some activity involving use of the apparatus, and allowed the lesson to end on a high note.

The above points were presented to the teachers frequently during the informal discussions that occurred between teacher and supervisor. However, they were formally issued to the teachers for recapitulatory purposes shortly before the Christmas recess.

b. The improvement of the STANDARD OF PERFORMANCE (quality of movement) of each child in the class.

Whatever the task the children were asked to perform it was vital that they perform it to their optimum ability. For example, if the instructions were for the children to "move freely around the whole area showing differences in speed and direction," there were several basic facets of the work for the children to perform--space, speed and direction. This in itself proved a complex task for many of the children and needed close direction and guidance, for each facet provided the children with the opportunity to move in many different ways. In a relay, if the rules demanded that a child skip to a turning line and hop back, then the skipping and hopping should be performed correctly. Additionally the change from skipping to hopping should be accomplished at the turning line, and not just near it. Compliance with the basic teaching instructions was vital to good work being accomplished.

The second way to improve the standard of performance was to stress the "best" or "most effective" ways of carrying out a movement. For example, before carrying out complex ball-handling skills, each child should have been able to achieve the basic skills of bouncing, throwing and catching. Games involving the use of balls will be better performed if some prior work has been completed on ball-handling skills. Thus work progressed from the simple to the more complex. The section[10] of the manual entitled "The Use of Small Apparatus" was useful in this regard.

c. Increasing the RANGE of activities the children could perform.

This, it was suggested, could be accomplished by developing and manipulating every piece of teaching material presented to the children. Every child should have both experienced a very wide variety of movements and be given the instructions and opportunities to allow him to improve his performance to the best of his ability. Most of the activities in the manual could be adjusted to suit the capabilities of the children in the class.

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[10] An example from this section has been included in Appendix B.

Similar suggestions were made to the teachers of the Art program. Three points were stressed:

a. VARIETY in project opportunities; it was important for each child to experience a very wide range of activities. This was accomplished by using the different types of work, and then developing and manipulating the same activities.

b. Child PERFORMANCE should improve; the notion of a child's performance being improved was not limited to the precision of the work, though this was important, the standard was also improved by encouraging creativity.

c. Established LESSON FORM; though the major portion of each lesson was taken up by paper cutting, painting, etc., DOING should be accompanied by UNDERSTANDING.

The introduction of the lesson, both in respect to instructing the children WHAT to do, and HOW they could accomplish it, should also include discussion concerning the shapes, decorations, designs, colors and perspectives involved. Discussions along these lines, and discussion of the work of individual children's work could take place at any time during the lesson. Examples of the types of questions that could be discussed were given to all the teachers in the art program.

Demonstrations and Child Observation

The use by the teacher, of the child to demonstrate was considered very important. Acknowledging the inappropriateness of expecting, in many cases, the teacher to demonstrate, and at the same time realizing the motivating force of child demonstration as being powerful to the others in the class, the ability of the teacher to use this technique was stressed. In the manual, reasons were listed for giving demonstrations:

To show something that is new, well done, or that has been improved.

To show the many responses to a task; responses can have similarities and differences.

To show important features of a performance or to test the observing powers of the children.

Teachers were reminded to ensure that the children could all see the demonstration and hear what was being said. That demonstrations should not be too long or too frequent, and that different children should be used was stressed.

Much of the value of any demonstration can be lost without careful planning. Teachers, attempting to develop the child's understanding of movement, described the aspects of the demonstration which were important--before the activity. Thus the children were not just "looking at", they were "looking for . ..."

Question and answer, carefully used, was a vital part of the teaching/learning situation. "What do you notice about the direction of the blue lines in Gerry's drawing?" helps in testing a child's powers of observation. In summary, in attempting to indicate to the teachers the many facets of teaching technique, the worth of the programs was seen as being infinitely more than a series of pieces of work to be presented to the class. The programs were primarily educative, their secondary (albeit vital) characteristic was the teaching medium; physical education or art.

Equipment Used In The Experimental Treatments

Introduction

The project assumed the responsibility for providing the equipment which was necessary for the teaching programs.

The Physical Education Programs

The following apparatus was used:

Small rubber balls (size of tennis balls).

Large 8½ inch rubber playground balls.

Individual rubber mats - 72" x 24" x 1½".

Long and short ropes.

Colored hoops.

Bean bags.

The equipment was distributed so that in the individualized program a class of twelve children would be supplied with twelve of each piece of apparatus. Likewise, in the group oriented program a class of twelve children would be supplied with a maximum of six of each piece of apparatus.

The Art Program

Abundant supplies of art materials were distributed to each teacher in this program. Additional items were purchased for the teachers when the need arose, for example, when a teacher wished to attempt some task for which the project had not planned.

Among the items distributed were:

Paper plates - small and large.
Dixie cups.
Straws.
Doilies.
String.
Yarn.
Powder paint - eight colors.
Brushes.
Glue.
Pencils.
Crayons.
Clay.
Paper clips.
Paper fasteners.
Pipe cleaners.
Construction paper - various colors.
Drawing paper.
Newsprint.
Stiffboard.
Staplers.
Plastic tape.
Tooth picks.
Potatoes.
Apples.
Dried beans and peas.
Macaroni.

Control of the Environment

The Teaching Environment

Briefly it can be said that the physical education lessons occurred either out of doors or in centrally heated rooms within the school physical plant. In the first case it has been assumed that the temperature and humidity conditions were suitable for satisfactory teaching-learning situations, while in the second case it has been assumed that when outside weather conditions became contrary to the program needs, then lessons took place inside the building.

All art lessons took place in the classrooms.

The Testing Environment

Regardless of the class, the environment for the testing of the motor performance items was similar in all cases. All motor performance tests were conducted out of doors. All other testing took place inside the building.

It is thought that although the conditions of temperature and humidity were not controlled, the nature and quality of the teaching or testing were not affected in any way that might distort the results.

CHAPTER THREE

THE EFFECTS OF THE EXPERIMENTAL TREATMENTS

Introduction

The purpose of this investigation was to determine the role of educational physical activity programs in modifying selected aspects of the behavior of educable mentally retarded children and minimally brain injured children of elementary school age. Specifically, the research was designed to answer three questions:

1. What are the differential effects on the motor, intellectual, social and emotional development of children who follow the three experimental programs (two physical education and one art program), compared with those who pursue their usual classroom instructional program?

2. Are there differences in the motor, intellectual, social, and emotional development of children who follow the special physical education programs, compared with those participating in the art program?

3. What differences are there in the motor, intellectual, social, and emotional development of children in the individual physical education program compared with those following the group-oriented physical education program?

In answering the above questions due consideration was given to the effects of disability, chronological age and sex.

In order to examine the effects of the experimental treatments and the fixed effects of disability, chronological age and sex, fifteen hypotheses were tested for each of four parameters of behavior (motor, strength, intellectual, and social). These are listed in Table 9. The hypotheses tested for the emotional aspects of behavior required separate but identical analyses for the two age levels (children aged six to nine years and children ten to thirteen years). The explanation and rationale for this procedure was outlined in Chapter 2. The fourteen hypotheses tested in connection with the latter analyses are shown in Table 10. The 5 per cent level of significance was set for rejection of the null hypothesis.

In all, 74 hypotheses were tested (see Tables 11 and 12). Twelve of the 74 were rejected. Of the twelve, only three first order interactions and one second order interaction were rejected. The following are the hypotheses which were rejected:

Motor Performance: Main effect of Program

Motor Performance: Interaction effect of Age x Program

Motor Performance: Main effect of Disability

TABLE 9

NULL HYPOTHESES TESTED: THE MOTOR, STRENGTH, INTELLECTUAL, AND SOCIAL PARAMETERS OF BEHAVIOR

1.	Main Effect:	Program
2.	Main Effect:	Age
3.	Main Effect:	Disability
4.	Main Effect:	Sex
5.	Interaction Effect:	Disability x Age
6.	Interaction Effect:	Disability x Sex
7.	Interaction Effect:	Disability x Program
8.	Interaction Effect:	Age x Sex
9.	Interaction Effect:	Age x Program
10.	Interaction Effect:	Sex x Program
11.	Interaction Effect:	Disability x Age x Sex
12.	Interaction Effect:	Disability x Age x Program
13.	Interaction Effect:	Disability x Sex x Program
14.	Interaction Effect:	Age x Sex x Program
15.	Interaction Effect:	Disability x Age x Sex x Program

TABLE 10

NULL HYPOTHESES TESTED: THE EMOTIONAL PARAMETER OF BEHAVIOR

1. **Main Effect:** **Program**
2. **Main Effect:** **Disability**
3. **Main Effect:** **Sex**
4. **Interaction Effect:** **Sex x Program**
5. **Interaction Effect:** **Disability x Program**
6. **Interaction Effect:** **Disability x Sex**
7. **Interaction Effect:** **Disability x Sex x Program**

TABLE 11

THE RESULTS OF THE HYPOTHESIS TESTING: THE MOTOR, STRENGTH, INTELLECTUAL, AND SOCIAL PARAMETERS OF BEHAVIOR

Effect	Probability Less Than			
	Motor Performance	Strength Behavior	Intellectual Behavior	Social Behavior
Program	0.0001*	0.7179	0.0182*	0.3915
Disability	0.0022*	0.0698	0.0024*	0.2005
Age	0.3424	0.1197	0.0029*	0.0887
Sex	0.3035	0.7292	0.2222	0.4247
Disability x Age	0.3864	0.1411	0.1173	0.5941
Disability x Sex	0.2864	0.2419	0.7890	0.3411
Disability x Program	0.0653	0.7122	0.5362	0.9401
Age x Sex	0.5135	0.0810	0.2698	0.3446
Age x Program	0.0248*	0.5403	0.5294	0.7559
Sex x Program	0.1068	0.3628	0.3451	0.8434
Disability x Age x Sex	0.9014	0.5281	0.9498	0.8719
Disability x Age x Program	0.0654	0.1941	0.1690	0.7050
Disability x Sex x Program	0.9531	0.9420	0.7906	0.7611
Age x Sex s Program	0.5337	0.7265	0.9274	0.8438
Disability x Age x Sex x Program	0.6455	0.2545	0.2173	0.9744

*Null hypothesis rejected at the 5% level

TABLE 12

THE RESULTS OF THE HYPOTHESIS TESTING:
THE EMOTIONAL PARAMETER OF BEHAVIOR

	Probability Less Than	
Effect	Younger Children	Older Children
Program	0.0043*	0.3924
Disability	0.0247*	0.1468
Sex	0.0380*	0.3443
Sex x Program	0.3257	0.8677
Disability x Program	0.0439*	0.0364*
Disability x Sex	0.5886	0.4326
Disability x Sex x Program	0.0334*	0.2969

*Null hypothesis rejected at the 5% level

Intellectual Behavior: Main effect of Program

Intellectual Behavior: Main effect of Age

Intellectual Behavior: Main effect of Disability

Emotional Behavior (Younger): Main effect of Program

Emotional Behavior (Younger): Interaction effect of Disability x Program

Emotional Behavior (Younger): Interaction effect of Disability x Sex x Program

Emotional Behavior (Younger): Main effect of Sex

Emotional Behavior (Older): Interaction effect of Disability x Program

The remainder of this chapter presents in some detail a review of the multivariate analyses which resulted in rejection of the null hypothesis. The discussion which follows is oriented to the differential effects of the several programs upon those parameters of behavior where statistically significant effects were noted.

Reference to Tables 11 and 12 discloses that sex was significant as a main effect for only one of the parameters of behavior (emotional behavior of the younger children). The interpretation of such results does not mean that the level of performance of the boys and girls was the same, but that the degree to which these performances changed during the experimental treatments did not differ significantly. Caution should be exercised in generalizing from these findings since it will be recalled that the number of girls was limited in several cells (see Table 2). Thus it is conceivable that the predominance of males in nearly every class may have modified the behavior of the girls unduly.

The results of the hypothesis testing for the strength items revealed that no significant differences occurred for main effects or for any interaction. The four strength items in that behavioral vector were:

Right Hand Grip

Left Hand Grip

Double-Handed Pull

Double-Handed Push

It is perhaps important to point out that no specific work of a strengthening nature occurred in any of the experimental programs.

Thus, while one might expect gains in strength to occur over a six month period, as a function of normal development, no measurable change was noted which would suggest that one treatment program was superior to any other in affecting this trait.

Not one of the 15 hypotheses for testing the effect of program, disability, age and sex upon social behavior was rejected. Since these measures were objective, and supplemented by other observations of a subjective nature, the failure to reject any of the fifteen hypotheses was somewhat surprising. The results were surprising because the program supervisor, the directors of special services, and most of the teachers of the experimental treatment classes had voiced the opinion that many children previously rejected by others in the class were not chosen. It was observed that some children appeared to "come out of their shell" or come to life.

The test items were the Cowell Social Behavior Trend Index (a measure of outgoing or extroverted behavior), and measures of peer Acceptance or Rejection. It was thought that the involvement of children in programs that were directed to their capabilities rather than to their limitations might result in the development of positive (extroverted) behavior. Additionally, it was expected that the involvement of children in a program which specifically was group oriented, would result in some children being less rejected than before. None of this was demonstrated in the results.

The thought that the social behavior of children should be open to positive modification was of interest, and it is recommended that further examination of this permise should occur.

Modification in Motor Performance

Introduction

As pointed out earlier the Modified AAHPER Test Battery was used to assess the motor performance of all of the children in the study. Using pre- and post-test scores, multivariate analysis of variance, incorporating covariance procedures, was used in testing the fifteen hypotheses listed in Table 9. Three of these were rejected at the 5% level of significance. No second or third order interactions were significant. The three rejected null hypotheses were for the main effect of program and of disability, and for the interaction effect of age x program.

The Main Effect of Program

The nature of the four programs has been described earlier in the report. It was stressed that the programs were educational; they were appropriate to the needs and characteristics of the children, being geared to their abilities rather than their limitations. The programs were educational and therefore were distinctly different from physical education programs which, for example, were recreational or contained merely fitness activities. The understanding of the child, of what was being done was emphasized. Merely "going through the motions" was not enough.

A second point which was stressed was with respect to the content of the programs in relation to the content of the testing. Previous research had used the motor performance test items as a major part of the program. Therefore not only were children able to practice the test items but were constantly given a knowledge of their results. It was not surprising in these studies to find large gains being made by the experimental groups. Neither was it surprising that the groups included to control for the Hawthorne effect did not perform as well as those in the physical activity group. This procedure was considered totally inappropriate, and was not repeated in the present study.

It has frequently been demonstrated that many physiological and motor performance parameters can be positively changed through specific training schedules. In this research, the interest was in examining the role of educational physical activity programs in eliciting positive changes in several aspects of behavior. The concomitant learnings were also considered to be important.

The results of the multivariate analysis of covariance, testing the main effect of the programs, are included in Table 13. The null hypothesis that there were no differential effects attributable to programs was rejected ($F = 5.74$; $P < 0.0001$). The contribution of six of the seven variables in the vector can be seen. Performance in the 300-yard run did not yield a statistically significant univariate F value.

In order to determine if the effects of the programs did, in fact, differ, three planned comparisons were made. The first was a comparison of the mean performance of the three special programs with the performance of the classes who had no special program. Table 14 indicates that the null hypothesis was tenable ($F = 1.804$; $P < 0.108$). In other words, children offered the special programs (physical education and art) showed no greater overall changes in motor performance than those in the control group. The significant contribution of the sit-ups test is worthy of note.

The second null hypothesis, comparing the mean performance of the physical education programs with that of the art program was rejected ($F = 13.6$; $P < 0.0001$). Six of the seven variables in the vector contributed significantly to the overall F value (see Table 15). As may be noted, the contribution of the 300-yard run was minimal. The direction of the difference was determined by an examination of the relative positions of the adjusted means for these six events. The adjusted means by treatments for four of the events are shown graphically in Figure 5. It is clear that after adjusting for pre-test differences the physical education classes demonstrated a superior position to the art classes. It was particularly noticeable that on the softball throw, an event which was consistently discriminatory, the differences in performance were most marked. While data on the dash are not illustrated, reference to Table 15 shows the significant effect of this variable on the multivariate F.

It was important to know whether differences in motor performance existed between the classes involved in the individualized physical education program, and those involved in the group oriented program. It can be seen

TABLE 13

MOTOR PERFORMANCE: MAIN EFFECT OF PROGRAM

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS

F = 5.7401* F less than 0.0001

D.F. = 21 and 41.2517

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Arm Hang	137.8034	11.5934	0.0001
2.	Sit-Ups	236.1245	31.8839	0.0001
3.	Shuttle Run	3.4775	3.1991	0.0304
4.	Broad Jump	286.7837	23.9260	0.0001
5.	50-Yard Dash	2.0725	11.6984	0.0001
6.	Ball Throw	300.4803	20.9408	0.0001
7.	300-Yard Run	8157.0355	0.9924	0.4033

D.F. for Hypothesis = 3

D.F. for Error = 55

7 covariates had been eliminated

*Null hypothesis rejected at the 5% level

TABLE 14

PLANNED COMPARISON FOR MOTOR PERFORMANCE TESTS: MAIN EFFECT OF PROGRAM - HYPOTHESIS ONE

That no differences exist between the motor performance of those children having Special Programs, and those having no Special Programs.

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS

F = 1.8039 P less than 0.1078

D.F. = 7 and 49.0000

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Arm Hang	0.7836	0.0659	0.7984
2.	Sit-Ups	31.7530	4.2876	0.0431
3.	Shuttle Run	2.8894	2.6581	0.1088
4.	Broad Jump	34.2425	2.8568	0.0967
5.	50-Yard Dash	0.0667	0.3764	0.5421
6.	Ball Throw	19.7007	1.3730	0.2464
7.	300-Yard Run	25966.3939	3.1591	0.0811

D.F. for Hypothesis = 1

D.F. for Error = 55

7 covariates had been eliminated

TABLE 15

PLANNED COMPARISON FOR MOTOR PERFORMANCE TESTS: MAIN EFFECT OF PROGRAM - HYPOTHESIS TWO

That no differences exist between the motor performance of those children having Physical Education Programs, and those having the Art Program.

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS

F = 13.6005* P less than 0.0001

D.F. = 7 and 49.0000

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Arm Hang	126.2370	10.6204	0.0020
2.	Sit-Ups	362.1002	48.8944	0.0001
3.	Shuttle Run	4.7130	4.3358	0.0420
4.	Broad Jump	382.8774	31.9429	0.0001
5.	50-Yard Dash	3.6121	20.3886	0.0001
6.	Ball Throw	648.9616	45.2269	0.0001
7.	300-Yard Run	22.0453	0.0027	0.9589

D.F. for Hypothesis = 1

D.F. for Error = 55

7 covariates had been eliminated

***Null hypothesis was rejected at the 5% level**

TABLE 16

PLANNED COMPARISON FOR MOTOR PERFORMANCE TESTS: MAIN EFFECT OF PROGRAM - HYPOTHESIS THREE

That no differences exist between the motor performance of those children having the Individualized Physical Education Program, and those having the Group-Oriented Physical Education Program.

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS

F = 13.2257* P less than 0.0001

D.F. = 7 and 49.0000

Variable	Between Mean Square	Univariate F	P Less Than
1. Arm Hang	340.8233	28.6736	0.0001
2. Sit-Ups	353.7761	47.7704	0.0001
3. Shuttle Run	3.9292	3.6147	0.0626
4. Broad Jump	462.6839	38.6011	0.0001
5. 50-Yard Dash	2.8525	16.1009	0.0002
6. Ball Throw	253.6721	17.6787	0.0001
7. 300-Yard Run	6.6760	0.0008	0.9774

D.F. for Hypothesis = 1

D.F. for Error = 55

7 covariates had been eliminated

*Null hypothesis was rejected at the 5% level

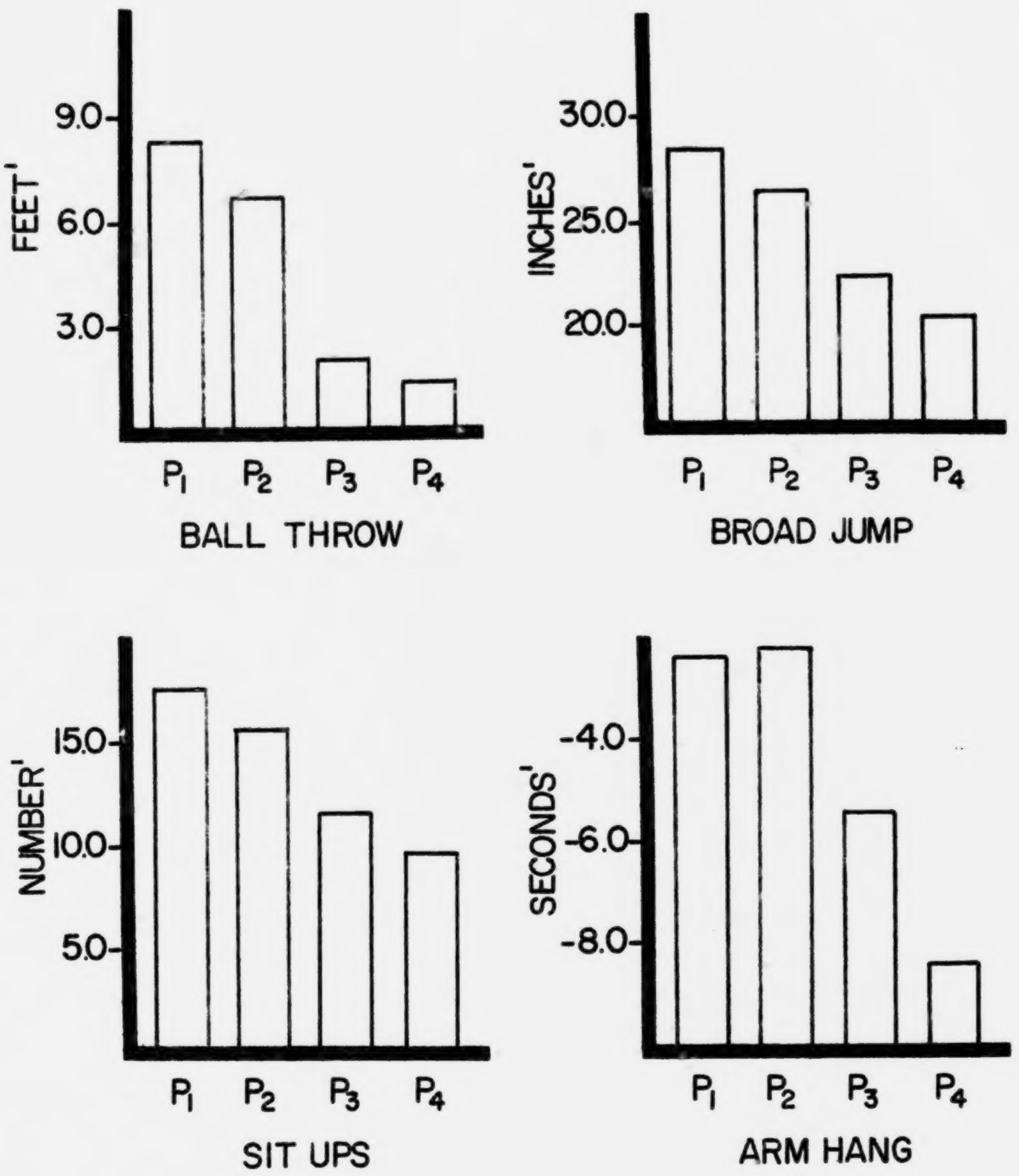


FIGURE 5. MOTOR PERFORMANCE[1]: Main Effect of Program, for the Ball Throw, Broad Jump, Sit Ups, and Arm Hang

P_1 = Individualized Physical Education Program
P_2 = Group Oriented Physical Education Program
P_3 = Art Program
P_4 = Usual Program

[1] From Adjusted Means

from Table 16 that there were clear differences (F = 13.226; $P < .0001$). Five of the seven test items had a significant effect on the multivariate F value. In order to determine the direction of the differences the adjusted means were examined. Attention is again called to Figure 5. For three of the four items illustrated in Figure 5, the individualized program showed superiority. It appeared, therefore, that the individualized physical education program elicited changes in motor performance to a greater relative degree than the group oriented physical education program.

The direction of the difference for the arm hang was not consistent with that of the other three, but this difference was not sufficient to alter the overall trend of the superiority of the individualized program over the group oriented program. Interestingly, the mean performance on the dash was better for those in the physical education than in the art program, and better for those in the individual than for those in the group oriented physical education program.

Interaction Effect of Age x Program

As pointed out earlier the multivariate analysis showed that there was a significant interaction between age and program for the motor performance test battery as a whole. In other words, the treatments affected motor performance, as assessed here, differently for the two age levels. The results of the multivariate analysis are shown in Table 17. Further examination of Table 17 discloses that the univariate F values are statistically significant for two of the seven motor performance tests items; the arm hang and the ball throw.

The interpretation of the interaction effect was carried out by the previously described planned comparisons, and by examining the relative positions of the adjusted means for each of the four treatments by age level. Tables 18, 19 and 20 include details of these comparisons, and Figures 6 and 7 indicate the relative positions of the adjusted means for the two age levels by treatments for each of four motor performance items. The four items were selected for illustrative purposes because they repeatedly demonstrated that, in a rejection of the null hypothesis, they were contributing to differences in group performance. It can be seen from Table 18 that the null hypothesis for the first planned comparison was tenable (F = 1.001; $P < 0.436$). In other words, the special treatments had no differential effects on the measured motor performance of children of the two age levels compared with children in the control group. The contribution of the univariate test for the softball throw, $P < 0.091$ was the largest of any test item in the vector, and is pointed out since the same event appeared to discriminate levels of performance when other analyses or comparisons were being made.

In examining whether differences by age were indicated in the comparative performances across the vector for the mean of the two physical education programs compared with the mean performance of the classes in the art program, the null hypothesis was rejected at the 5% level (see Table 19). The multivariate F in this analysis was 2.396; $P < 0.034$. This indicated that the treatment effects on motor performance of the special physical education programs compared with the treatment effects of the art program

TABLE 17

MOTOR PERFORMANCE: INTERACTION EFFECT OF AGE X PROGRAM

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS

F = 1.7912* P less than 0.0248

D.F. = 21 and 141.2517

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Arm Hang	51.9664	4.3720	0.0079
2.	Sit-Ups	16.5629	2.2365	0.0943
3.	Shuttle Run	0.4751	0.4371	0.7274
4.	Broad Jump	18.6789	1.5584	0.2099
5.	50-Yard Dash	0.2651	1.4965	0.2257
6.	Ball Throw	40.6417	2.8324	0.0466
7.	300-Yard Run	9933.4612	1.2085	0.3153

D.F. for Hypothesis = 3

D.F. for Error = 55

7 covariates had been eliminated

*Null hypothesis rejected at the 5% level

TABLE 18

PLANNED COMPARISON FOR MOTOR PERFORMANCE TESTS: INTERACTION EFFECT OF AGE X PROGRAM - HYPOTHESIS ONE

That no differences exist between the motor performance of those children having Special Programs, and those having no Special Program.

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS

F = 1.0098   P less than 0.4362

D.F. = 7 and 49.0000

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Arm Hang	19.7103	1.6582	0.2033
2.	Sit-Ups	4.2589	0.5751	0.4515
3.	Shuttle Run	0.9750	0.8970	0.3478
4.	Broad Jump	20.1556	1.6816	0.2002
5.	50-Yard Dash	0.3780	2.1338	0.1498
6.	Ball Throw	42.5543	2.9657	0.0907
7.	300-Yard Run	3100.4774	0.3772	0.5417

D.F. for Hypothesis = 1

D.F. for Error = 55

7 covariates had been eliminated

TABLE 19

PLANNED COMPARISON FOR MOTOR PERFORMANCE TESTS: INTERACTION EFFECT OF AGE X PROGRAM - HYPOTHESIS TWO

That no differences exist between the motor performance of those children having Physical Education Programs, and those having the Art Program.

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS

F = 2.3961* P less than 0.0344

D.F. = 7 and 49.0000

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Arm Hang	3.9432	0.3317	0.5670
2.	Sit-Ups	41.9406	5.6632	0.0209
3.	Shuttle Run	0.0286	0.0263	0.8718
4.	Broad Jump	3.4453	0.2874	0.5941
5.	50-Yard Dash	0.4144	2.3392	0.1319
6.	Ball Throw	65.5848	4.5707	0.0370
7.	300-Yard Run	20450.3103	2.4880	0.1205

D.F. for Hypothesis = 1

D.F. for Error = 55

7 covariates had been eliminated

*Null hypothesis was rejected at the 5% level

TABLE 20

PLANNED COMPARISON FOR MOTOR PERFORMANCE TESTS: INTERACTION EFFECT OF AGE X PROGRAM - HYPOTHESIS THREE

That no differences exist between the motor performance of those children having the Individualized Physical Education Program, and those having the Group-Oriented Physical Education Program.

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS

F = 1.6198 P less than 0.1521

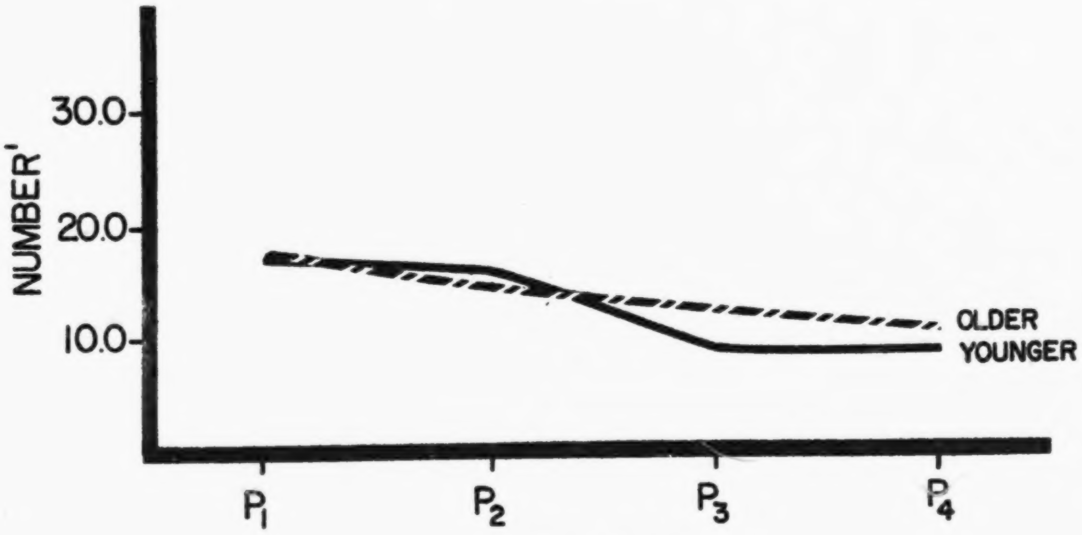
D.F. = 7 and 49.0000

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Arm Hang	102.4624	8.6202	0.0049
2.	Sit-Ups	0.7969	0.1076	0.7442
3.	Shuttle Run	0.7533	0.6930	0.4088
4.	Broad Jump	30.3841	2.5349	0.1171
5.	50-Yard Dash	0.0138	0.0777	0.7815
6.	Ball Throw	0.9376	0.0653	0.7993
7.	300-Yard Run	2427.4128	0.2953	0.5891

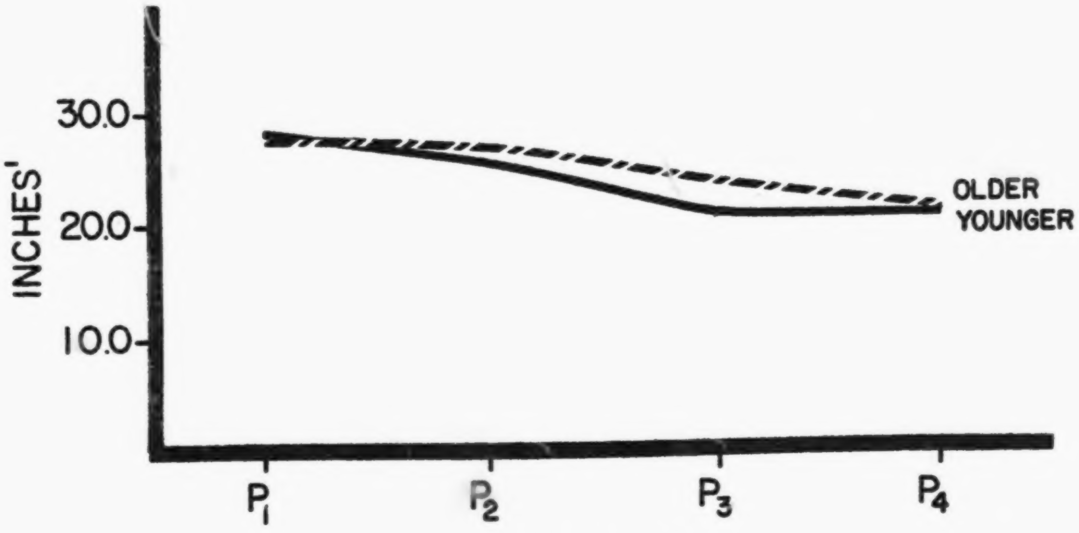
D.F. for Hypothesis = 1

D.F. for Error = 55

7 covariates had been eliminated



SIT UPS

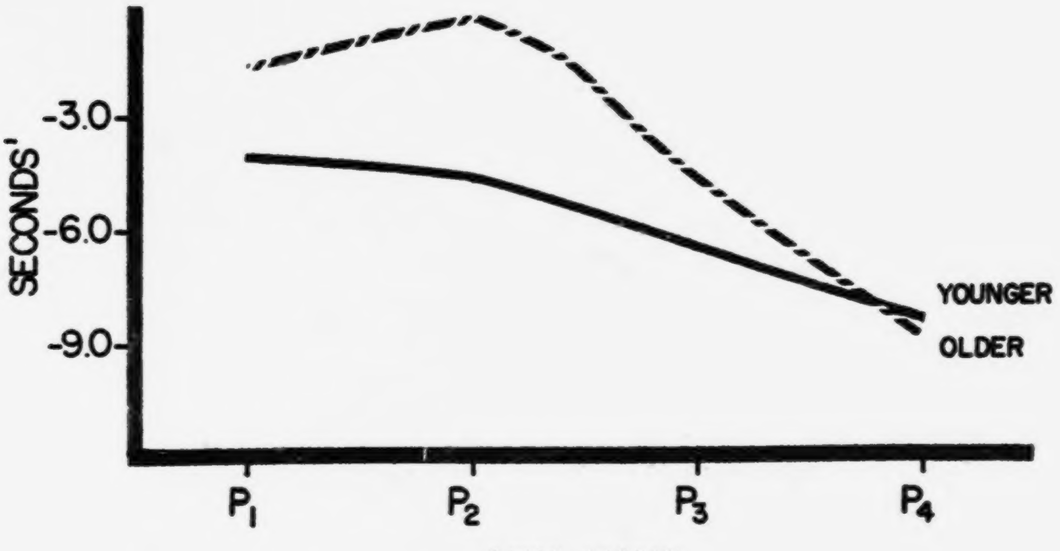


BROAD JUMP

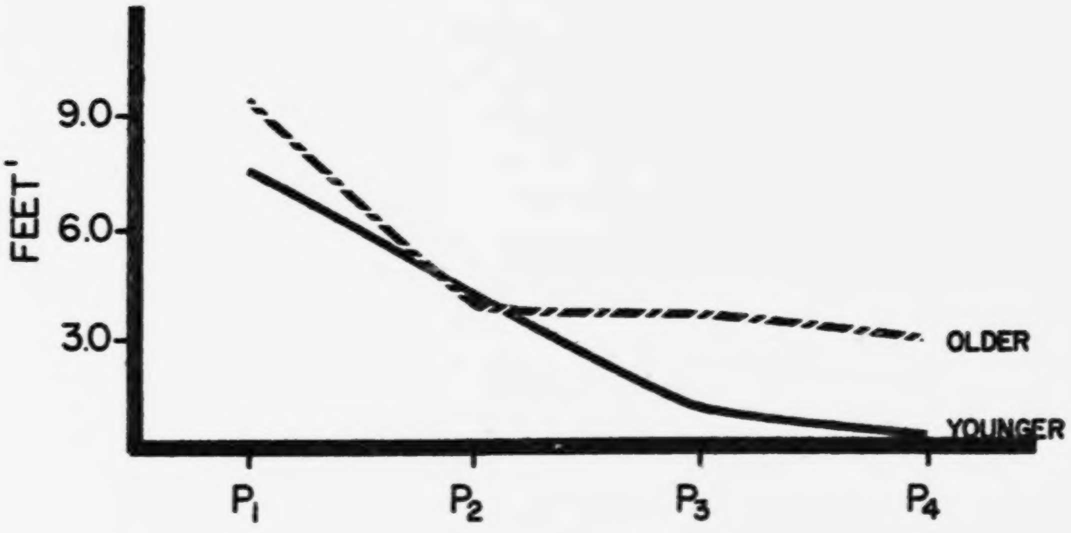
FIGURE 6. MOTOR PERFORMANCE': Interaction Effect of Age x Program, for the Sit Ups and Broad Jump

P_1 = Individualized Physical Education Program
P_2 = Group Oriented Physical Education Program
P_3 = Art Program
P_4 = Usual Program

[1] From Adjusted Means



ARM HANG



BALL THROW

FIGURE 7. MOTOR PERFORMANCE[1]: Interaction Effect of Age x Program, for the Arm Hang and Ball Throw

P_1 = Individualized Physical Education Program
P_2 = Group Oriented Physical Education Program
P_3 = Art Program
P_4 = Usual Program

[1] From Adjusted Means

were different for the two age levels. In each case the superiority of the two physical education programs over the art program in affecting motor performance is clearly shown. However, the effect of age on program is not consistent across events. For example, while the progress achieved by the older children is generally greater than by the younger, only in the arm hang (see Figure 7) is the effect of the special physical education program compared to the art program greater for the younger children. For the sit-ups, the adjusted means differ materially for the two age levels when comparing the effects of the physical education programs with that of the art program. The same holdstrue for the broad jump. In the ball throw, while the overall effect of the physical education program was superior to the art program, the effect of the art program was greater for the older children. It is clear that the effects of both the physical education and art programs on motor performance varied with age and the pattern of variation was not consistent across events. For the most part the physical activity programs had a more pronounced effect on motor performance than the art program and this effect was somewhat more noticeable for the older than for the younger children.

The results of the planned comparisons to determine if the effects of the two physical education programs on the motor performance of the children differed by age levels are shown in Table 20. The results of multivariate analysis ($F = 1.62$; $P < 0.152$) indicate that the effects of the two programs were not significantly different for the two age levels. Only on the arm hand was the univariate F for the interaction effect significant (see Table 20). The effect of the group oriented program was greater here on the older than on the younger children.

The Main Effect of Disability

The inclusion of minimally brain injured children in this investigation added a dimension not included in the earlier studies. In fact, there is very little data on the level of performance of these children on gross motor tasks, or the role which physical education lessons involving gross motor performance play in the behavior of the children. Hence the examination of the comparative change in motor performance was of considerable interest. The results of the multivariate analysis for the main effect of disability on the motor performance tests are given in Table 21. It is seen that the hypothesis for the main effect of disability was rejected at the 5% level ($F = 3.846$; $P < 0.002$). Thus, for this parameter of behavior, the educable mentally retarded children and the minimally brain injured children differed in their overall performance.

By an examination of the univariate F values it was noted that the strongest contribution to this difference was from the ball throw, but that the standing broad jump and the 50-yard dash were also contributing significantly. In order to determine the direction of these differences, reference was made to the relative position of the adjusted means as shown in Figure 8. It is clearly evident that for three of the four selected test items, the minimally brain injured children changed their performance differently, and in a superior fashion to the educable mentally retarded children. On the arm hang the results were very similar, with the retarded

TABLE 21

MOTOR PERFORMANCE: MAIN EFFECT OF DISABILITY

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS

F = 3.8363* P less than 0.0022

D.F. = 7 and 49.0000

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Arm Hang	0.2330	0.0196	0.8892
2.	Sit-Ups	15.5160	2.0951	0.1535
3.	Shuttle Run	3.4150	3.1416	0.0819
4.	Broad Jump	71.2234	5.9421	0.0181
5.	50-Yard Dash	1.0018	5.6544	0.0210
6.	Ball Throw	251.0211	17.4939	0.0002
7.	300-Yard Run	7731.2315	0.9406	0.3364

D.F. for Hypothesis = 1

D.F. for Error = 55

7 covariates had been eliminated

*Null hypothesis rejected at the 5% level

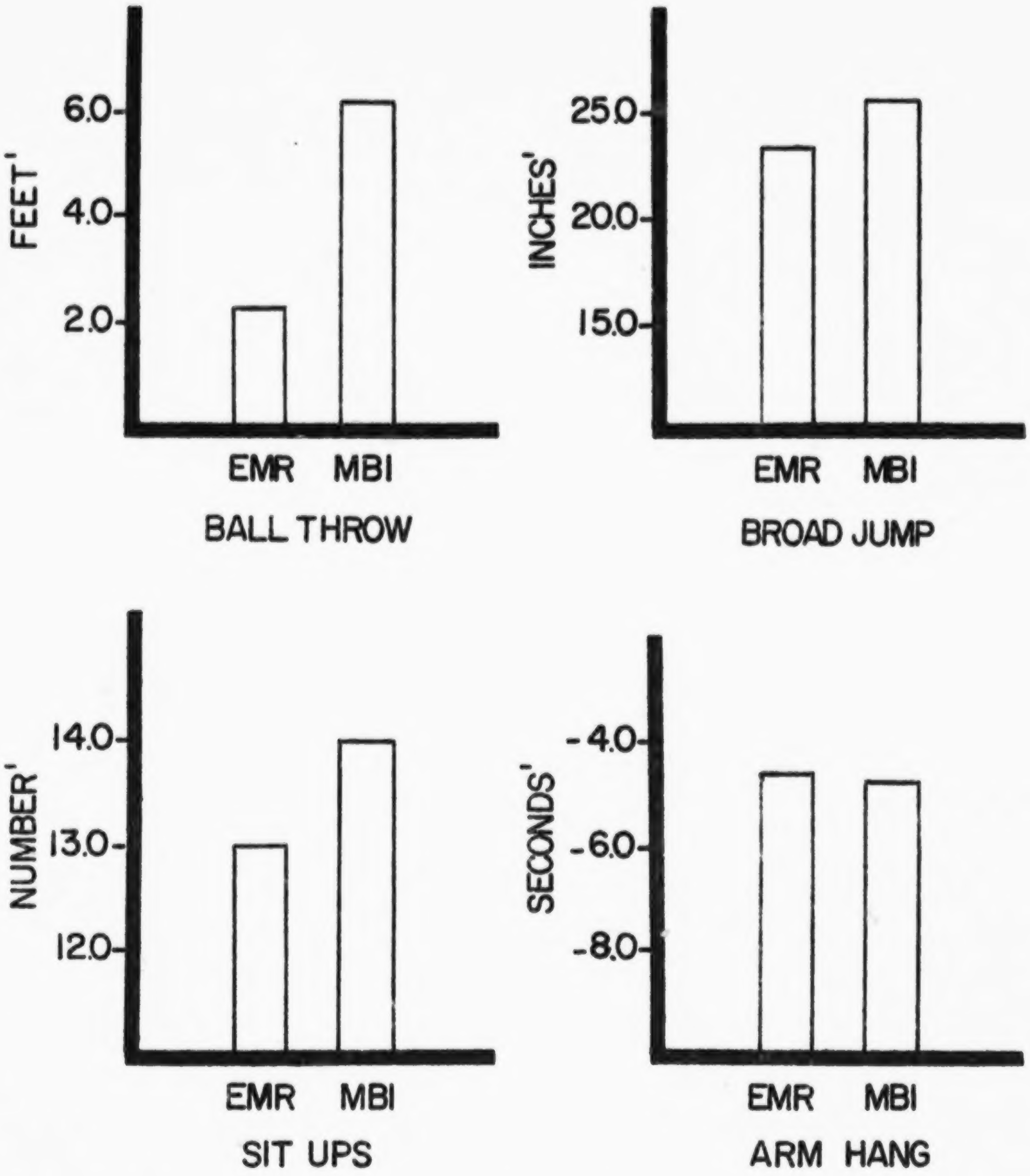


FIGURE 8. MOTOR PERFORMANCE[1]: Main Effect of Disability, for the Ball Throw, Broad Jump, Sit Ups, and Arm Hang

children showing slightly better performance. It is interesting to note that for the most part the children with the higher intelligence quotients ellicited the overall gains on the gross motor tasks.

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[1] From Adjusted Means

Discussion

Although seven motor performance test items were used to provide information on this parameter of behavior, a review of the univariate F's in the several analyses revealed that four items were usually working strongly towards the rejection of the test of no difference. These four test items were the arm hang, the sit-ups, the standing broad jump, and the softball throw.

From fifteen original hypotheses tested, three were found untenable: the main effect of program, the interaction effect of age x program, and the main effect of disability.

The results of the several multivariate and univeriate analyses and the planned comparisons would seem to warrant the following:

1. The main effect of the experimental physical education programs was to bring about greater motor performance changes in the classes following the individualized program than in those in the group oriented program. It was also observed that the physical education programs produced superior positional change with respect to the variables in the vector than did the art program.

2. There were no significant differences (P 0.108) between the rate of performance change of the classes involved in the specially planned experimental programs taken collectively and those involved in their usual instructional program. The minimal effect of the art program upon changes in motor performance dampened the positive effects of the two physical education programs.

3. From the significant interaction effect it was noted that there was a tendency for the position of the adjusted means of the older children to be superior to that of the younger children. The interaction effect of age on program (superiority of response of the older children) was more evident for the physical education programs than for the art programs.

4. In examining the main effect of the disability of the children it was noted that even after adjustments had been made for differences in the pre-test scores, the position of the minimally brain injured children was superior to that of the educable mentally retarded children.

The role of chronological age as a main effect in the research was not clearly shown for this parameter of behavior. However, from the results of the interaction effects it appeared that the older children showed a greater change in performance than the younger children, but that such a result was not independent of the effects of the programs.

Figures 9, 10, 11, and 12 show the pre- and post-test scores of the children on each of the four previously mentioned test items. On the arm hang sharp increases shown by the classes in the specially planned programs can be seen in contrast to what, in seven cells out of eight was a decrease in the performance of the children who were denied one of the special programs. A particularly noticeable change in performance can be seen by the classes of older educable retardates in the usual instructional program. These children ranked first on the pre-test scores, but while the other classes improved their scores sharply over the period of the research, they showed a large regression in performance. This feature was noted as being a general tendency across motor performance items. Examining the results on the other three items, a similar picture can be seen. First, consistent and marked increases in performance shown by the classes in the special programs, and second, the tendency for the non special treatment classes to show a decreased level of performance.

By examining the overall changes in performance for all the motor performance test items it was noted that the pattern of the classes in the art program was different from that of the classes in the other special programs. On the broad jump, the performance of those classes regressed in four of the eight cells, and it decreased also on one occasion for the ball throw, and once for the sit-ups. This result is consistent in confirming that the physical education programs elicited greater positive increases in motor performance than did the art program.

The relative increases shown by the two physical education programs can best be noted by referring to Figure 9, which indicates pre- and post-test means for the broad jump. For each of the eight disability x age x sex groups of classes, the increase in performance of both physical education classes is clearly observed. However, the degree to which the classes of children involved in the individualized program improved their performance over and above that shown by the classes in the group oriented program is less evident. This may be noted by referring to Figures 10, 11, and 12.

The way in which performance increases could be attributed to differences in the disability of the children was indicated previously as being in favor of the minimally brain injured children. This feature can be noted by examining Figure 11, which shows the pre- and post-test mean scores for the sit-ups. Although improved performance on this event was quite consistent, the steeper lines favor the brain injured children. Secondly, the brain injured children who pursued their usual instructional program, were more likely to retain or improve their level of performance; more likely, therefore not to regress. This same observation is supported by analyzing each of Figures 9, 10, 11, and 12. The following summarizes the results of the several analyses:

1. Improved performance was characteristic of the classes involved in all the special programs but was not so characteristic of the performance of the groups of children who were denied the special programs.

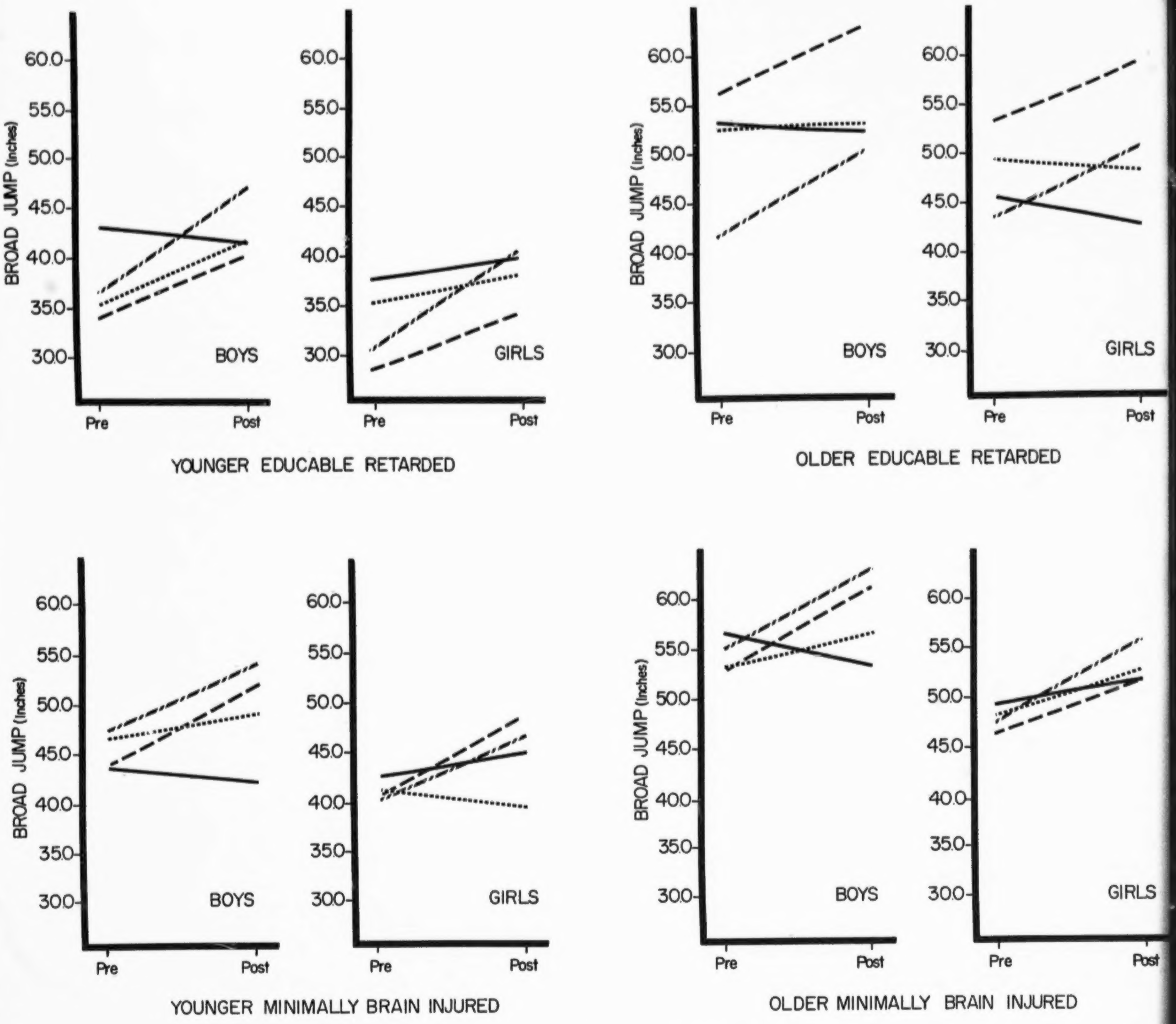


FIGURE 9. MEAN PRE AND POST BROAD JUMP SCORES, BY TREATMENT ACCORDING TO DISABILITY, AGE, AND SEX

INDIVIDUALIZED P. E. PROGRAM -·-·-·-·-
GROUP ORIENTED P. E. PROGRAM — — — —
ART PROGRAM ··············
USUAL PROGRAM ————

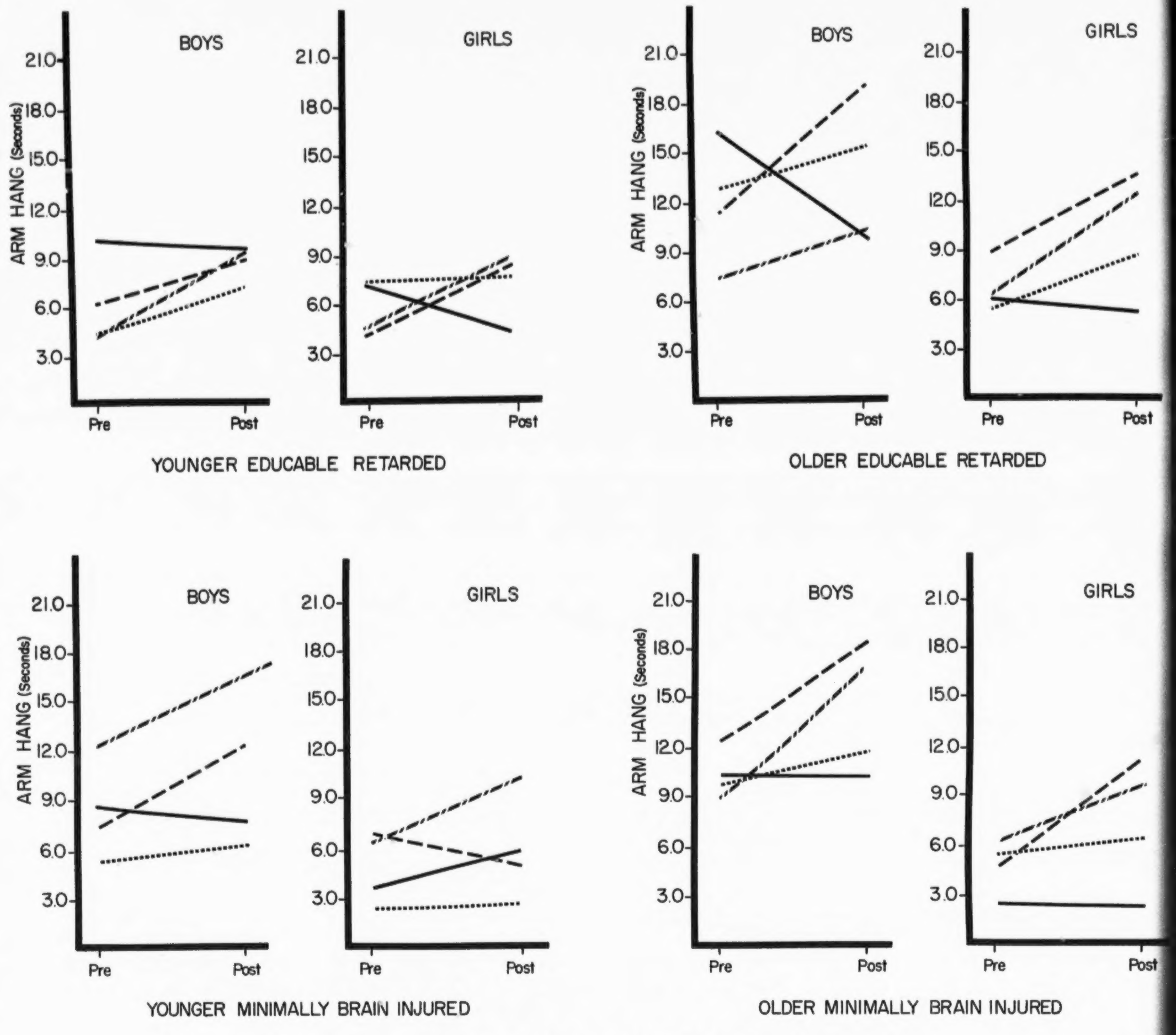
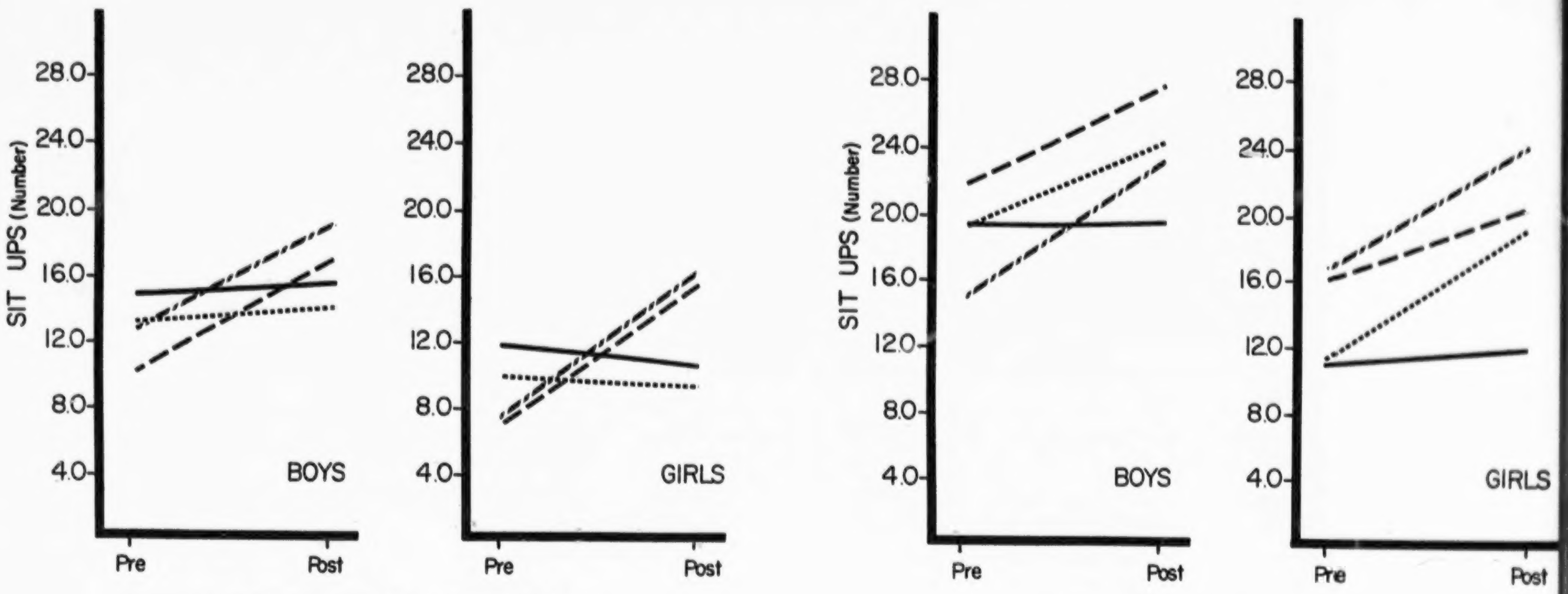


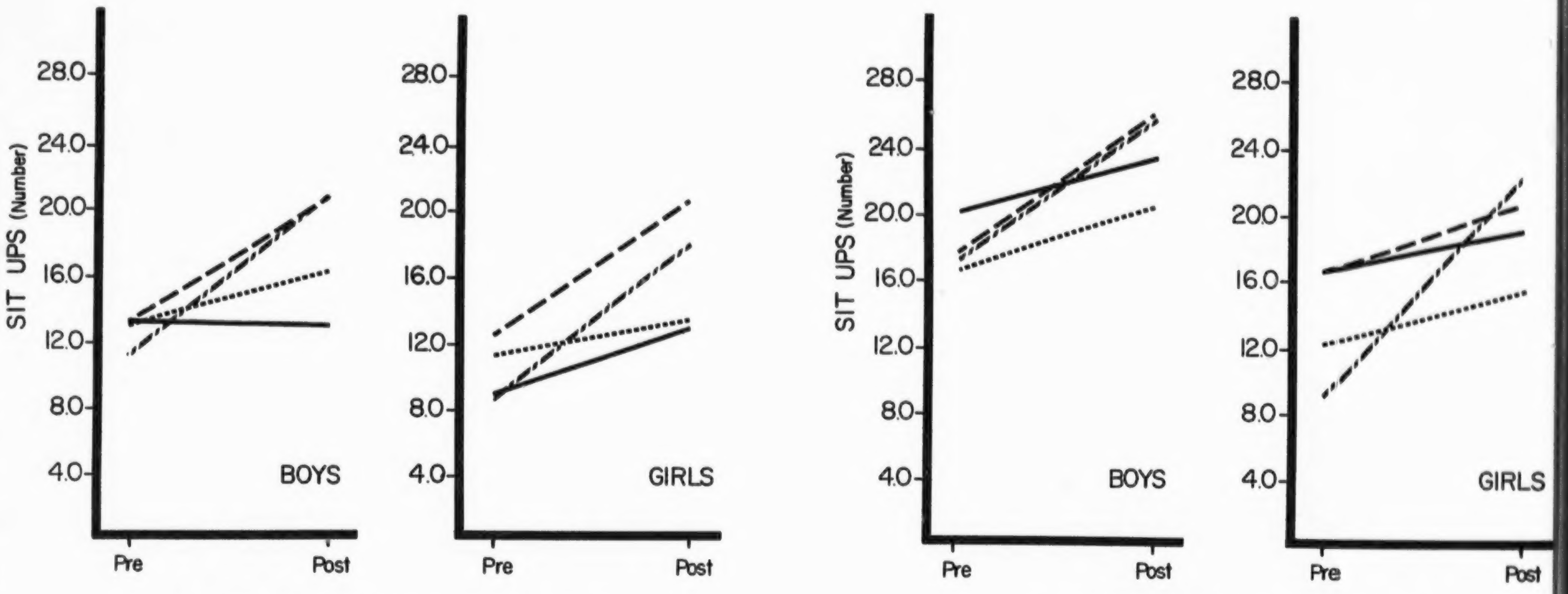
FIGURE 10. MEAN PRE AND POST ARM HANG SCORES, BY TREATMENT ACCORDING TO DISABILITY, AGE, AND SEX

INDIVIDUALIZED P. E. PROGRAM
GROUP ORIENTED P. E. PROGRAM
ART PROGRAM
USUAL PROGRAM



YOUNGER EDUCABLE RETARDED

OLDER EDUCABLE RETARDED

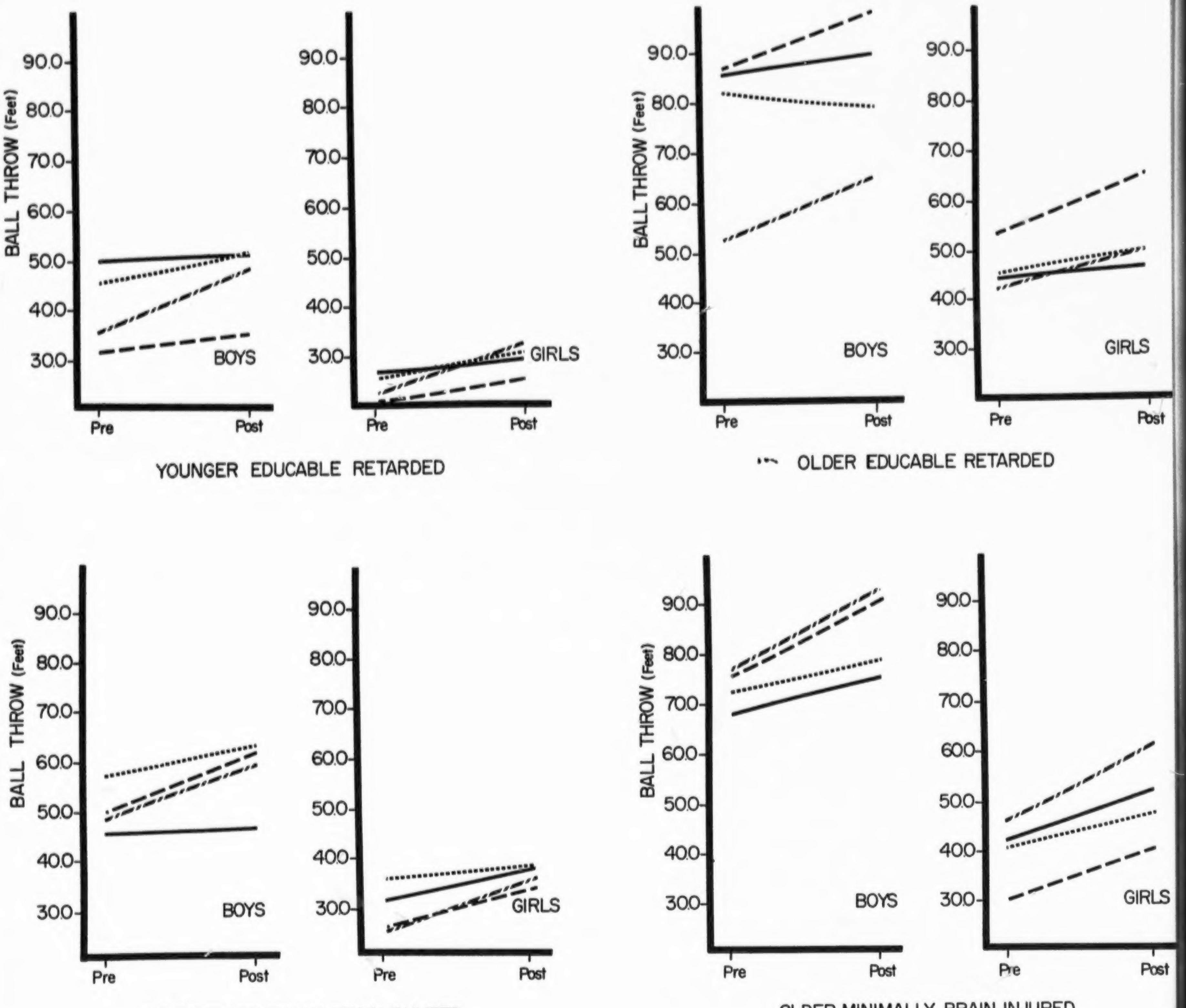


YOUNGER MINIMALLY BRAIN INJURED

OLDER MINIMALLY BRAIN INJURED

FIGURE 11. MEAN PRE AND POST SIT-UP SCORES, BY TREATMENT ACCORDING TO DISABILITY, AGE, AND SEX

INDIVIDUALIZED P. E. PROGRAM	-·-·-·-·-
GROUP ORIENTED P. E. PROGRAM	— — —
ART PROGRAM	··············
USUAL PROGRAM	———



YOUNGER EDUCABLE RETARDED

OLDER EDUCABLE RETARDED

YOUNGER MINIMALLY BRAIN INJURED

OLDER MINIMALLY BRAIN INJURED

FIGURE 12. MEAN PRE AND POST BALL THROW SCORES, BY TREATMENT ACCORDING TO DISABILITY, AGE, AND SEX

INDIVIDUALIZED P.E. PROGRAM	-·-·-·-·-
GROUP ORIENTED P.E. PROGRAM	— — —
ART PROGRAM	·········
USUAL PROGRAM	———

2. The improvements in motor performance favored the classes involved in physical education rather than art, but the performances changes of the art group exceeded those involved in no special program. This finding was characteristic of the older rather than the younger children.

3. Individualized instruction elicited improved performance to a greater degree than group oriented instruction.

4. Improved performance was more characteristic of the brain injured children than the retarded children. That is to say, the brain injured children showed greater relative gains in motor performance than the retarded children.

Modifications in Intellectual Behavior

Introduction

Two measures were used to assess the intellectual ability of the children. A measure of the verbal component was obtained from the Peabody Picture Vocabulary Test. The Bender Motor Gestalt Test protocol, scored by the Koppitz method (84), provided information on the performance component.

The data from these two tests were subjected to fifteen separate multivariate analyses of covariance to examine the relationship of the dependent and independent variables (post-test and pre-test scores). Three of the fifteen null hypotheses were rejected at the 5% level of significance. No interaction effect was statistically significant. The three rejected hypotheses were for the main effects of program, chronological age and disability.

Main Effect of Program

As mentioned in an earlier part of the report, the previous research studies by Oliver (107), Corder (40), and Lowe (93), had indicated that the level of intellectual behavior could be raised when physical activity lessons were added to the school schedule of educationally sub-normal (EMR) boys. Despite differences which had been noted between the design of those studies, and despite the limitations of the research procedures, the results of these studies were similar. These findings might well have been supported by Solomon and Pangle (130) except for the reported inappropriate conditions under which the post-testing took place.

The effect of program is clearly apparent in the present research as indicated in Table 22 which gives the results of the multivariate analysis. It is clear from this analysis that differences attributable to chance are highly unlikely, $P < 0.018$, $F = 2.672$. The same table shows that for the main effect of the program only the Peabody Picture Vocabulary Test was responsible for the overall significant F value. The univariate F of 72.328 for the variable is highly significant, $P < 0.003$.

TABLE 22

INTELLECTUAL BEHAVIOR: MAIN EFFECT OF PROGRAM

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS

F = 2.6719*   P less than 0.0182

D.F. = 6 and 118.0000

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Peabody	72.3277	5.2918	0.0027
2.	Bender	1.2942	0.4049	0.7501

D.F. for Hypothesis = 3

D.F. for Error = 60

2 covariates had been eliminated

*Null hypothesis rejected at the 5% level

The adjusted means of the Peabody test grouped according to treatment are shown in Figure 13. By visual inspection these favor the experimental groups in comparison with the control group. The relative values of the adjusted means of the Bender test do not show as clear a pattern and are more difficult to interpret.

In order to clarify the effects of the several treatments on the performance of the Peabody test, the procedure of planned comparisons was followed. The three comparisons were between:

1. The performance of the classes involved in one of the three special programs, and those in the usual instructional program.

2. The performance of the classes in the physical education programs, and those in the art program.

3. The performance of the classes in the individualized physical education program, and those in the group-oriented physical education program.

Tables 23, 24, and 25 include the results of the multivariate and univariate analyses. In the first planned comparison the null hypothesis was rejected at the 5% level ($F = 3.788$; $P < 0.028$). This showed that the performance of the children in the special programs was significantly different from that of the classes who received no special program. By inspecting Table 23, the role of the Peabody test was again clearly demonstrated, since the univariate F value was significant beyond the 2% level. Referring to Figure 13, which shows the relative position of the adjusted means, the average of the three special programs is superior to the adjusted means of the children denied the special treatment. In interpreting the adjusted means it will be noted that in the Bender the fewer the errors the better the performances. Clearly what appears to be a limited role of this test is shown both in the univariate test results appearing in Table 23, and by examining Figure 13.

The second comparison questioned whether the average performance of those in the two physical education programs was similar to that of those pursuing the art program. In essence, the question here was whether the Hawthorne effect was operating; did the focus of attention affect the classes on the art program in the same way and to the same degree as it affected the physical education classes?

Reference to Table 24 demonstrates clearly that no differences existed; the hypothesis was tenable ($P < 0.777$; $F = 0.253$.) The failure to reject the hypothesis for the multivariate test was supported by an examination of the univariate results. Neither variable in the vector was making a significant contribution to the rejection of the null hypothesis. Figure 13, showing the relative position of the adjusted means, clearly supports this point, for by visual inspection it is evident that the adjusted mean of the art program closely approximates that of the average of the two physical education programs. However it is noteworthy that in each case the relative position of each of the three programs remained the

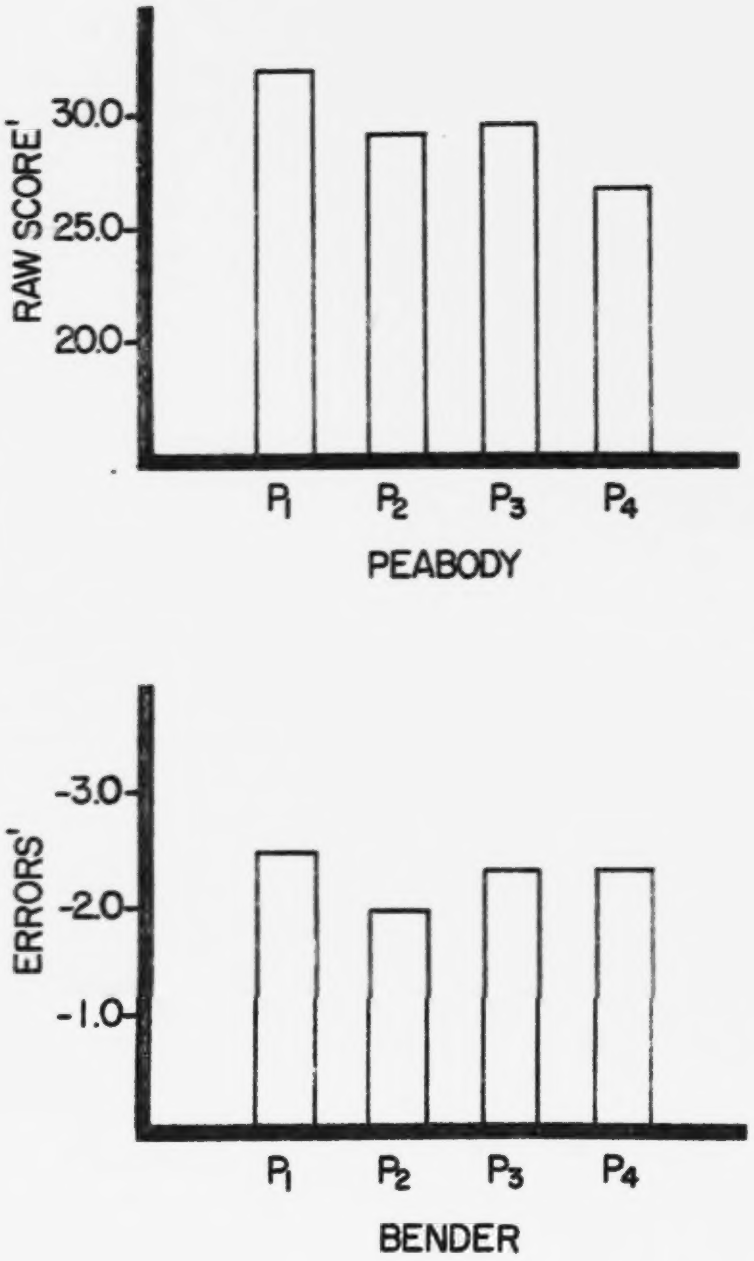


FIGURE 13. INTELLECTUAL BEHAVIOR': Main Effect of Program, for the Peabody and Bender Tests

P_1 = Individualized Physical Education Program
P_2 = Group Oriented Physical Education Program
P_3 = Art Program
P_4 = Usual Program

'From Adjusted Means

TABLE 23

PLANNED COMPARISON FOR INTELLECTUAL TEST ITEMS: MAIN EFFECT OF PROGRAM - HYPOTHESIS ONE

That no differences exist between the performance on the intellectual test items, of those children having Special Programs, and those having no Special Program.

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS

F = 3.7882* P less than 0.0284

D.F. = 2 and 59.0000

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Peabody	89.6769	6.5611	0.0130
2.	Bender	3.4424	1.0769	0.3036

D.F. for Hypothesis = 1

D.F. for Error = 60

2 covariates had been eliminated

*Null hypothesis was rejected at the 5% level

TABLE 24

PLANNED COMPARISON FOR INTELLECTUAL TEST ITEMS: MAIN EFFECT OF PROGRAM - HYPOTHESIS TWO

That no differences exist between the performance on the intellectual test items of thosechildren having Physical Education Programs and those having the Art Program.

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS

F = 0.2534 P less than 0.7771

D.F. = 2 and 59.0000

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Peabody	6.2397	0.4565	0.5019
2.	Bender	0.2013	0.0630	0.8028

D.F. for Hypothesis = 1

D.F. for Error = 60

2 covariates had been eliminated

TABLE 25

PLANNED COMPARISON FOR INTELLECTUAL TEST ITEMS: MAIN EFFECT OF PROGRAM - HYPOTHESIS THREE

That no differences exist between the performance on the intellectual test items of those children having the Individualized Physical Education Program and those having the Group-Oriented Physical Education Program.

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS

F = 5.8279*   P less than 0.0050

D.F. = 2 and 59.0000

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Peabody	161.1380	11.7895	0.0011
2.	Bender	0.2785	0.0871	0.7689

D.F. for Hypothesis = 1

D.F. for Error = 60

2 covariates had been eliminated

*Null hypothesis was rejected at the 5% level

same. That is to say, the classes engaged in the individualized physical education program had the highest adjusted mean on both tests, and those in the art program out-performed those in the group-oriented physical education program. The practical significance of these results are discussed later in this chapter.

The third comparison examined the respective roles of the two physical education programs and questioned whether there were differences between the performance of those in the individualized physical education program compared with those in the group-oriented program.

The data in Table 25, shows that the hypothesis for the multivariate test was not supported ($F = 5.828; P < 0.005$). It may be noted from Figure 13 that the significant difference was in favor of the individualized program, since the adjusted means were superior for that program for both the Peabody and the Bender tests. By examining Table 25, the univariate F values for the tests indicate that again, as for every comparison relating to the overall significance of the main effect of program, the Peabody test was working strongly in producing the significant F value for this comparison.

Main Effect of Chronological Age

The design of the study called for children of two chronological age levels, one group in the age range six to nine years, the other in the age range ten to thirteen years. The age grouping was used to determine the possible differential effect of the treatments on children of different age levels. It was assumed that there would be some change in intellectual development over the six months experimental period, but whether the effect of change in chronological age upon changes in parameters of intelligence would be different for the two age levels needed to be determined.

The hypothesis that no statistically significant differences would be present between the younger and older children was rejected (see Table 26). Significant differences between the two age levels were found (multivariate $F = 6.481; P < 0.003$). Both the Peabody and Bender tests were contributing to the rejection of the null hypothesis. The F value for each variable in the vector was significant at or beyond the 2% level.

In clarifying the direction of the reported differenced the adjusted means were examined. Figure 14 indicates the superior relative position of the older children with respect to both tests. On both tests the older children made relatively greater gains than the younger. Since there was no interaction between age and program there is no evidence that program in and of itself was related to the differential gains in the measures of intelligence for the two age levels.

Main Effect of Disability

The results of the multivariate analysis and the univariate analysis for the effect of disability on themeasures of intelligence are given in Table 27. The hypothesis that the changes in these parameters of development

TABLE 26

INTELLECTUAL BEHAVIOR: MAIN EFFECT OF AGE

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS

F = 6.4805* P less than 0.0029

D.F. = 2 and 59.0000

Variable	Between Mean Square	Univariate F	P Less Than
1. Peabody	99.7455	7.2977	0.0090
2. Bender	18.2880	5.7211	0.0200

D.F. for Hypothesis = 1

D.F. for Error = 60

2 covariates had been eliminated

*Null hypothesis rejected at the 5% level

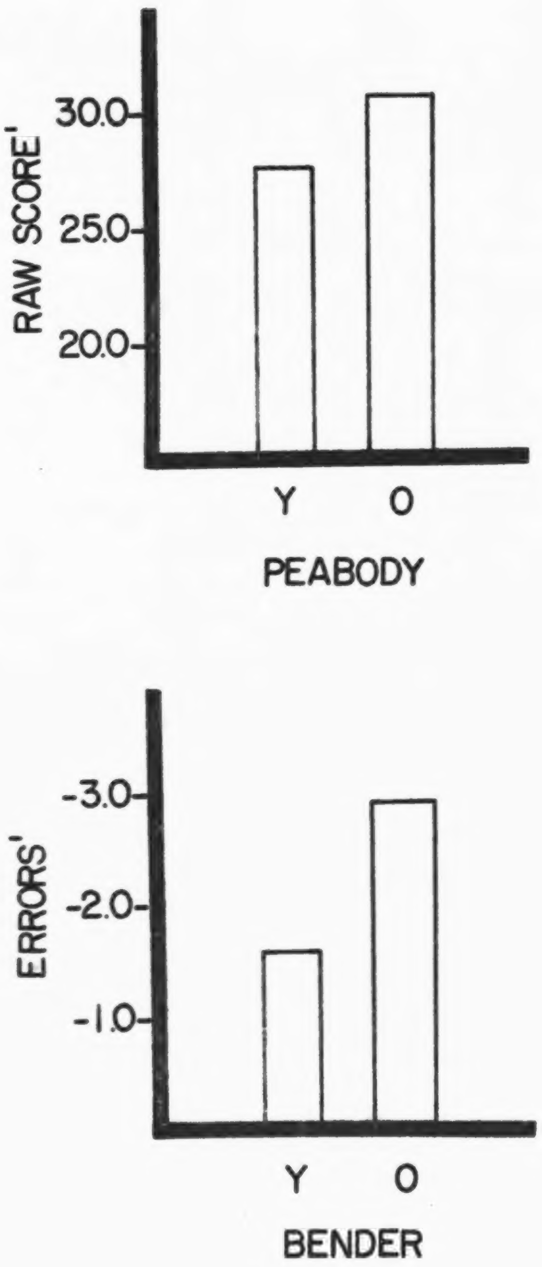


FIGURE 14. INTELLECTUAL BEHAVIOR[1]: Main Effect of Age, for the Peabody and Bender Tests

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[1] From Adjusted Means

TABLE 27

INTELLECTUAL BEHAVIOR: MAIN EFFECT OF DISABILITY

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS

F = 6.7117* P less than 0.0024

D.F. = 2 and 59.0000

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Peabody	90.4647	6.6187	0.0126
2.	Bender	21.9396	6.8635	0.0112

D.F. for Hypothesis = 1

D.F. for Error = 60

2 covariates had been eliminated

*Null hypothesis rejected at the 5% level

were not different for the two disability groups was not tenable ($F = 6.712$; $P < 0.002$). The significant univariate F values for each variable demonstrated that both the Peabody and the Bender Tests were contributing to the overall significant F value.

An examination of the adjusted means indicates that for both tests, the mean of the classes of minimally brain injured children is higher than for the educable mentally retarded classes. That is to say, after adjusting for the differences between the pre- and post-test means, the performance of the MBI classes was superior. This is clearly shown in Figure 15, which shows the relative position of adjusted means.

The relatively greater gains of the brain injured children in the measured aspects of intelligence can in no way be attributed to treatment effects. There was in fact, no significant interaction between disability and treatment for these aspects of behavior. It is widely known that on intelligence tests, MBI children perform better than EMR children. They are therefore apt to profit more from their educational experiences than retarded children and hence show greater gains on intellectual tests than retarded children.

Discussion

Two tests, recognized by those in special education, were used in assessing the intellectual behavior of the children. A measure of the verbal component of intelligence was obtained by using the Peabody Picture Vocabulary Test, and the Bender Motor Gestalt Test was used to obtain an indication of the performance component of intelligence. The rationale for using these two tests was so that information could be obtained for making interpretations comparable to the verbal and performance parts of the Wechsler Intelligence Scale for Children.

Three of the fifteen null hypotheses originally tested were found untenable; the main effect of disability, the main effect of chronological age, and the main effect of the programs. No interactions were significant.

The results given in this section of the chapter are believed to be of considerable importance since the question of change in intelligence has been the center of controversy and interest for some time.

Within the limitations of this research, the following observations appear justified.

1. No differences were found in the rate at which improved intellectual behavior was characteristic of one type of special instructional program compared with another. In other words the same changes occurred for children in the art[1] program as occurred for those in the physical education programs.

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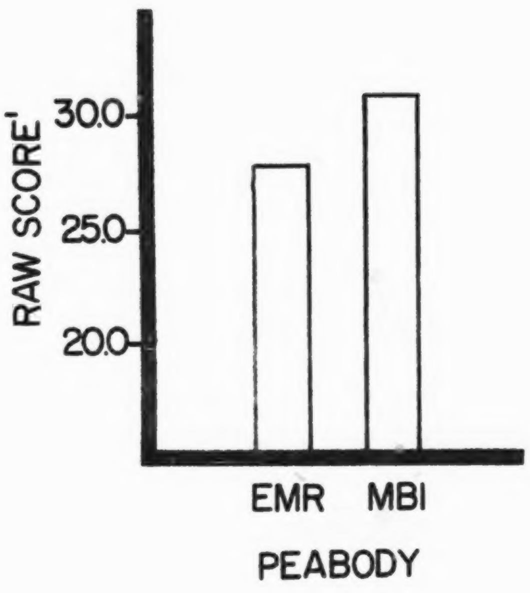
[1] This program was included specifically to control for the possible existence of the Hawthorne effect.



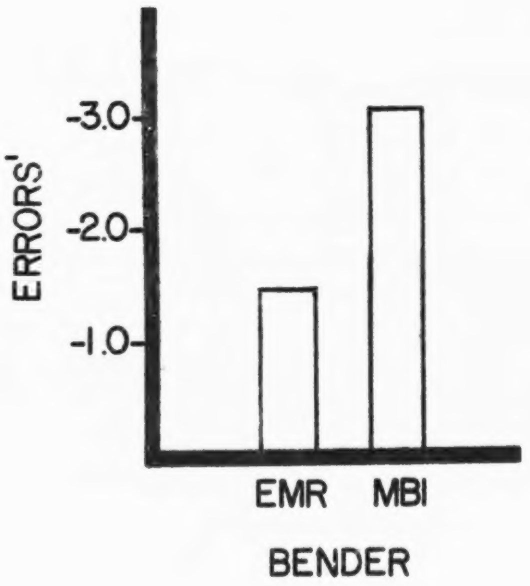


FIGURE 15. INTELLECTUAL BEHAVIOR[1]: Main Effect of Disability, for the Peabody and Bender Tests

[1] From Adjusted Means

2. The magnitude of the improved intellectual behavior was demonstrated to favor the children involved in the physical education program in which the orientation was towards the individual rather than towards the group.

3. The role of the experimental treatments in eliciting positive change in the intellectual behavior of the children was indicated. Over and above the changes noted for the children involved in the usual instructional program, changes attributable to maturation, the performance of the children in the three special programs was clearly superior to that of the usual instruction program.

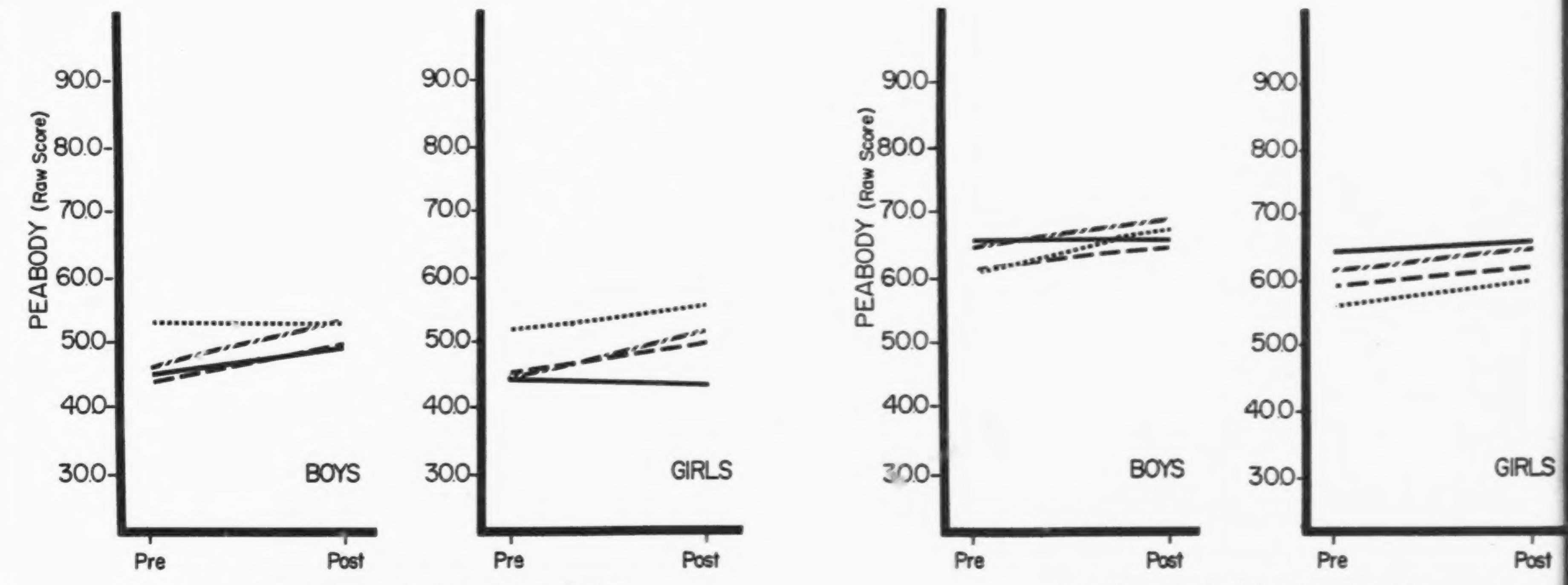
4. By examining the degree to which changes in the rate of performance increase were attributed to chronological age, superior position was noted to be in favor of the older children. These children were from ten to thirteen years old.

5. From the analysis of the main effect of disability, the extent of positive change in intellectual behavior favored the minimally brain injured children. This pattern was noted also in the motor performance of the children

In summarizing graphically the effects of treatment, age, disability, and sex upon performance changes in the Peabody and Bender Test scores, mean pre- and post-test scores on these two measures of intelligence have been plotted in such a way that the effects of the treatments can be compared according to age, sex, and disability. The results on the Peabody are shown in Figure 16 and for the Bender in Figure 17. As pointed out earlier, the older children showed relatively greater gains in tests scores on both the Peabody and Bender than the younger children. The differences according to age could not be attributed to the special treatments. However, it should be recalled that the special treatment did bring about greater changes in the measures of intelligence than that occurring in the control group.

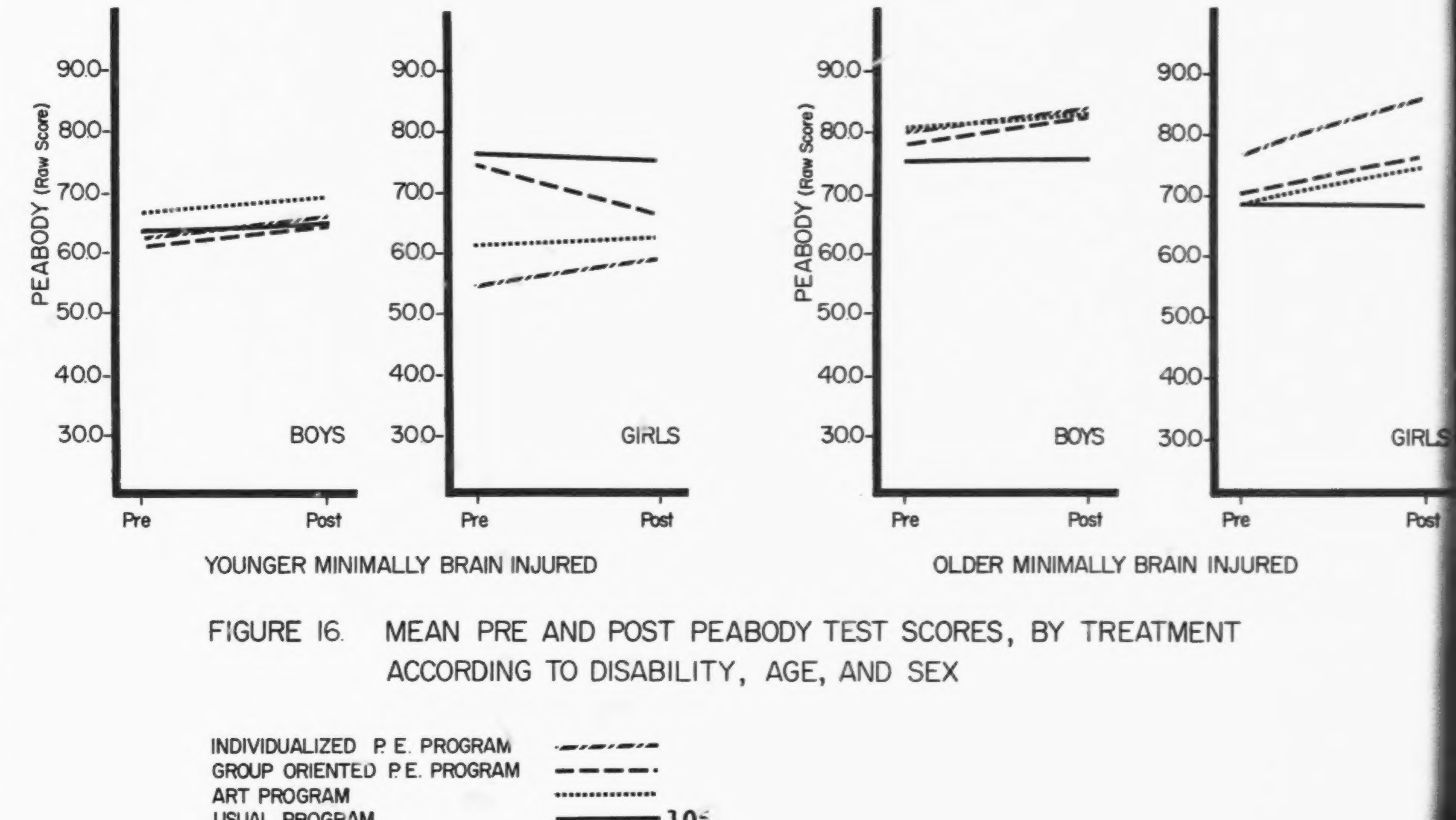
An examination of the effect of the disability on the performance of the children, reveals that relative performance increases favor the brain injured children. This finding is consistent with that reported for the motor performance results. It was evident that the greater gains in intellectual and motor behavior were made by the children who, in this research were of superior intellectual ability. These results, for this parameter of behavior, may be seen by examining Figure 17.

The data presented in both Figures 16 and 17 indicate that the magnitude of the change in behavior favored the classes involved in the special programs rather than those classes who had no special program. Figure 16 shows that on the Peabody test children in five out of eight cells decreased their scores on this test, over the period of six months. The pattern of change was distinctly different for the children in the special programs, where the tendency for an increase in performance was consistent, though with minor exceptions.



YOUNGER EDUCABLE RETARDED

OLDER EDUCABLE RETARDED

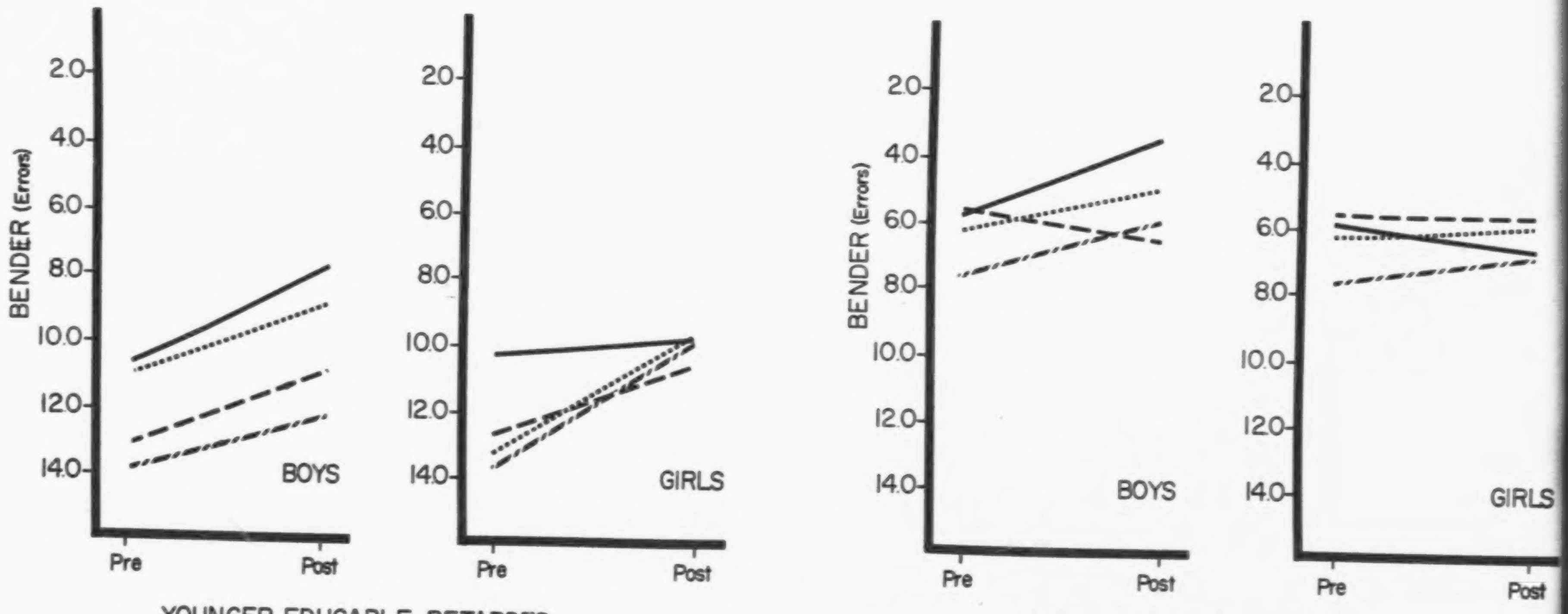


YOUNGER MINIMALLY BRAIN INJURED

OLDER MINIMALLY BRAIN INJURED

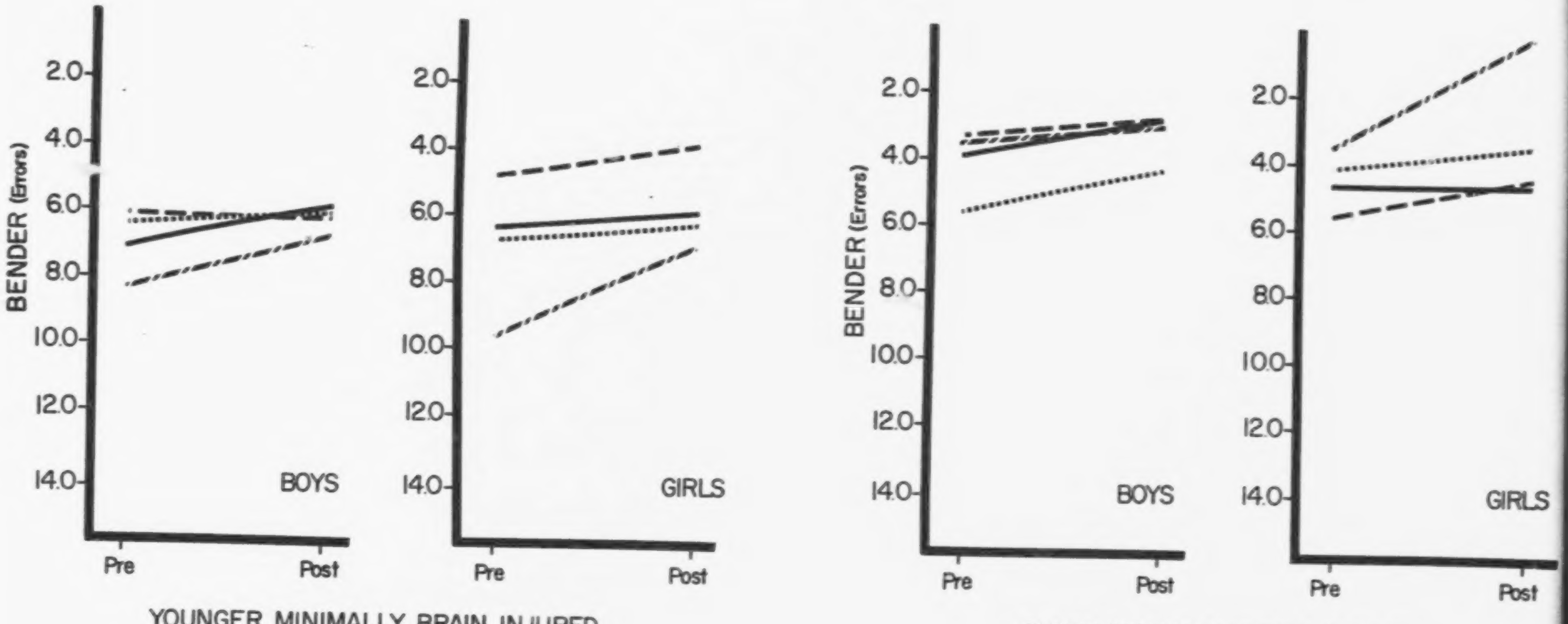
FIGURE 16. MEAN PRE AND POST PEABODY TEST SCORES, BY TREATMENT ACCORDING TO DISABILITY, AGE, AND SEX

INDIVIDUALIZED P.E. PROGRAM -·-·-·-
GROUP ORIENTED P.E. PROGRAM — — —
ART PROGRAM ············
USUAL PROGRAM ———



YOUNGER EDUCABLE RETARDED

OLDER EDUCABLE RETARDED



YOUNGER MINIMALLY BRAIN INJURED

OLDER MINIMALLY BRAIN INJURED

FIGURE 17. MEAN PRE AND POST BENDER TEST SCORES, BY TREATMENT ACCORDING TO DISABILITY, AGE, AND SEX

INDIVIDUALIZED P.E. PROGRAM -·-·-·-
GROUP ORIENTED P.E. PROGRAM — — —
ART PROGRAM ··········
USUAL PROGRAM ———

By an examination of Figures 16 and 17, the differential response of the two physical education programs can be seen. On the Peabody Picture Vocabulary Test the tendency was for the children in the individualized physical education program to increase their scores to a greater extent than the children in the group oriented program. It can be seen that the results for five of the eight cells favor the individualized physical education program. These observations support and confirm the multivariate test results, and the examination of the adjusted means.

As a result of the planned comparisons it was noted, that in respect to the main effect of the program, the classes in the special programs out-performed the classes who received no special treatment. It was also observed that the relative position of the adjusted means of classes involved in the individualized physical education program were superior to those of the group oriented program.

The position of the adjusted means for the physical education programs, however, was not significantly different from that for the art program. This result indicated that the art program was as effective as the physical education program in eliciting change in performance on the two tests. This level of performance was over and above that exhibited by the classes for which change could be attributable to maturation. It appeared, therefore, that it was the existence of a special program which elicited such responses, rather than maturation, or particular lesson content alone.

By examining Figures 16 and 17, it is evident that the improvement of the classes who participated in the art program was generally consistent across disability, age, and sex. No sharp increase or regression was observed for either the Peabody Picture Vocabulary Test or the Bender Motor Gestalt Test for classes in this program.

Modifications in Emotional Behavior

Introduction

In order to assess the emotional behavior of the educable mentally retarded children, and the minimally brain injured children, two tests were used. First a score from the protocol of the Bender Motor Gestalt Test was obtained for the number of "emotional indicators" exhibited by the children, in their drawings. Secondly scores from thirteen factors common to two of the Cattell series of personality questionnaires were obtained. The younger children were given the Early School Personalty questionnaire, and the Children's Personality Questionnaire was used with the older children.

Because it had been decided to use raw scores in the Cattell series rather than standardized scores (to retain the discriminatory powers of the test), separate coveriance analyses were used for each age group. Separate analyses were necessary because of differences in the scales in the two tests. The treatment of the data followed the same general plan as for the preceding analyses except that age was no longer a factor. Hence the design was one of three factors, disability (EMR and MBI), sex (boys and girls), and program (four types).

A word of caution is necessary in interpreting the results for this parameter of behavior. For the pre-test and for the post-test several children had difficulty completing the questionnaire, even when assisted by the classroom teacher. On the pre-test, especially, several children were unable to complete the test (12 cases), possibly because of their very limited intellectual level. Other children produced answers which indicated perseveration, a characteristic which is well-known in brain injured children, but which in this research was exhibited more, particularly by the very young educable mentally retarded children.

Where obvious perseveration occurred (15 cases), the protocol was not scored. However, it is not known whether other questionnaires, which did not show a patterned response which was easily noticeable, were in fact a series of haphazard responses.

The difficulties in selecting tests for this parameter of behavior resulted in a very limited choice being available. It may well be that some of the responses obtained were invalid. Care must be taken, therefore, in interpreting this section of the results.

For each age level, seven hypotheses were tested by the use of the multivariate analyses referred to earlier. The results are given in Table 12. It will be noted that while five of seven hypotheses were rejected for the younger children, only in one of the seven hypotheses for the older children did a significant difference occur. Whether this was a function of a greater impact of the treatment on the younger children, whether the younger children, by virtue of their maturity level, were less resistant to personality changes, or whether the differences observed were a function of the measures is not known.

Results of the Analyses for the Younger Children

As mentioned in the early part of this section the multivariance analysis resulted in rejection of five of the seven hypotheses which were tested. Supporting data will be given on each of the five rejected hypotheses together with a full discussion of each.

Main Effect of Program

The results of the multivariate analysis which revealed a significant main effect of program on the emotional behavior of the younger children is shown in Table 28. Clearly, the programs had different effects on this parameter of behavior. Personality factors B and Q_4 were both making a contribution in this.

It may be noted in Table 29 that the multivariate test for the first planned comparison (effect of special treatments versus the usual program) resulted in the null hypothesis being rejected. ($F = 49.16$: $P < 0.02$). This indicates that the differences between the classes having special programs and those having the usual instructional program cannot be attributed to chance.

TABLE 28

EMOTIONAL BEHAVIOR (YOUNGER): MAIN EFFECT OF PROGRAM

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS

F = 8.2730* P less than 0.0043

D.F. = 42 and 6.6983

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Emotional Indicators	0.2009	0.6498	0.5953
2.	Personality A	1.9619	1.7363	0.2025
3.	B	5.0945	3.2897	0.0500
4.	C	1.5168	0.8852	0.4712
5.	D	1.3325	0.4688	0.7085
6.	E	2.0444	2.1677	0.1344
7.	F	2.9952	1.6647	0.2171
8.	G	0.7993	1.7052	0.2087
9.	H	1.0052	0.5438	0.6598
10.	I	0.9047	0.7407	0.5442
11.	J	0.9620	1.0397	0.4035
12.	N	1.7542	2.1486	0.1369
13.	O	1.8154	1.2246	0.3353
14.	Q_4	4.1634	5.7802	0.0079

D.F. for Hypothesis = 3
D.F. for Error = 15
14 covariates had been eliminated

*Null hypothesis rejected at the 5% level

TABLE 29

PLANNED COMPARISON FOR EMOTIONAL TEST ITEMS (YOUNGER): MAIN EFFECT OF PROGRAM - HYPOTHESIS ONE

That no differences exist between the performance on the emotional test items of those children having Special Programs and those having no Special Program.

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS
F=49.1519* P less than 0.0202
D.F. = 14 and 2.0000

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Emotional Indicators	0.0922	0.2981	0.5931
2.	Personality A	0.6333	0.5605	0.4657
3.	B	1.7149	1.1074	0.3094
4.	D	1.1813	0.6894	0.4194
5.	D	2.3859	0.8393	0.3741
6.	E	0.1239	0.1314	0.7221
7.	F	2.4768	1.3764	0.2591
8.	G	0.0814	0.1737	0.6828
9.	H	0.9147	0.4949	0.4926
10.	I	0.0000	0.0000	0.9952
11.	J	0.7564	0.8174	0.3803
12.	N	0.0289	0.0354	0.8533
13.	O	3.3612	2.2674	0.1529
14.	Q_4	2.7784	3.8573	0.0684

D.F. for Hypothesis = 1
D.F. for Error = 15
14 covariates had been eliminated

*Null hypothesis rejected at the 5% level

Since Personality Factors B and Q_4 consistently make the greatest differences in the multivariate analyses these factors have been used for graphic illustration. An examination of Figure 18 reveals that for both of these personality characteristics the direction of the differences favored the special experimental programs.

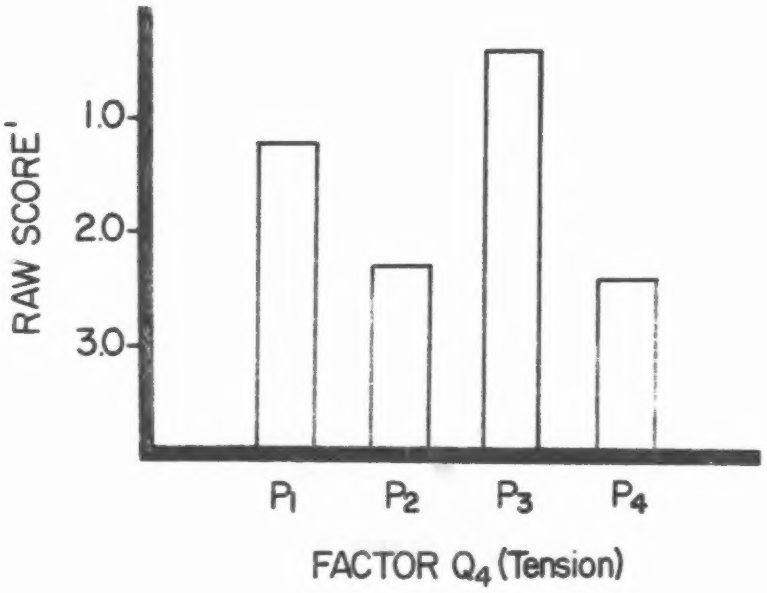
The second planned comparison was used to note if differences existed between those in the art program and those in physical education for the variables which assessed emotional behavior. Using multivariate techniques the null hypothesis was rejected ($F = 73.48$; $P < 0.14$). Figure 18 indicates that the classes of children involved in the art program improved their performance to a greater degree than the classes involved in the physical education programs. This was particularly noticeable for Factor Q_4, which measures the extent to which a subject is tense or overwrought. One might infer from this that the art program had a more soothing and relaxing effect than the physical activity programs.

The multivariate analysis used in the third planned comparison (effect of the individual versus the group oriented physical education programs) resulted in the rejection of the null hypothesis ($F = 111.61$. $P < 0.009$). This showed that differences existed between the performance of the children in the individualized physical education program, and those in the group oriented physical education program. In order to determine the direction of the differences the adjusted means were examined. In Figure 18 it can be seen that for personality trait B (intelligence) the superior position favored the classes of children who participated in the individualized physical education program. Similarly for Factor Q_4 (tension) the direction of the differences favored the classes in the individualized program.

Interaction Effect of Disability x Program

As is shown in Table 32 the multivariate analysis yielded a statistically significant interaction effect between disability and program ($F = 3.63$; $P < 0.044$). The contribution of Factor B to the significant interaction should be noted. In order to determine the effects of the several treatments on the significant interaction between disability and program, the previously described planned comparisons were made. No differences were found when the performance of the classes involved in special programs was compared to the classes having no special program ($P < 0.054$). (See Table 33.) Similarly, no differences existed between the classes in the individualized physical education program and those in the group oriented program ($P < 0.17$). See Table 35. Reference to Table 34, however, shows that the differences in the responses of the classes of children in the physical education programs in comparison to those in the art program varied with disability ($F = 123.1$; $P < 0.008$).

In order to describe the interaction between disability and program the adjusted means were examined. Figure 19 presents the relative positions of the adjusted means for both disabilities, for each of the four programs, and for factors Q_4 (tension), and B (intelligence) of the personality profile.



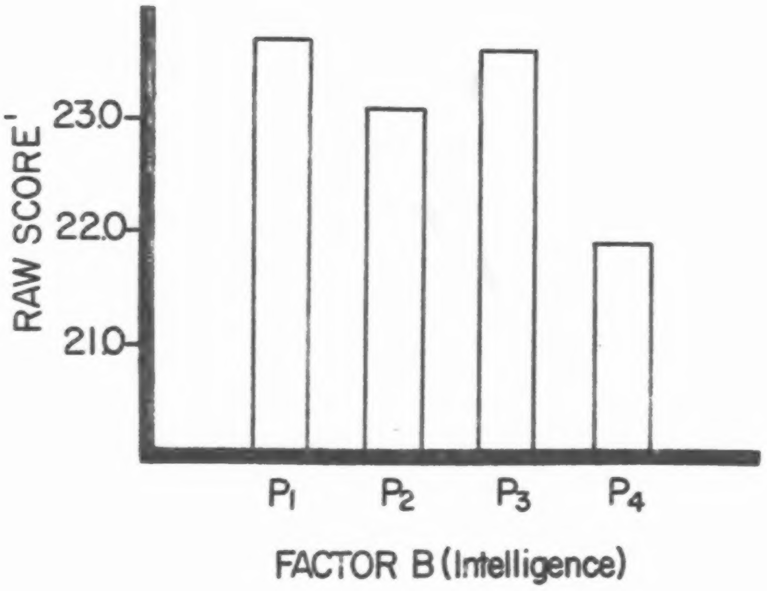


FIGURE 18. EMOTIONAL BEHAVIOR' (YOUNGER): Main Effect of Program, for Personality Factors Q_4 (Tension), and B (Intelligence)

P_1 = Individualized Physical Education Program
P_2 = Group Oriented Physical Education Program
P_3 = Art Program
P_4 = Usual Program

'From Adjusted Means

TABLE 30

PLANNED COMPARISON FOR EMOTIONAL TEST ITEMS (YOUNGER): MAIN EFFECT OF PROGRAM - HYPOTHESIS TWO

That no differences exist between the performance on the emotional test items of the children having a Physical Education Program and those having the Art Program.

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS
F = 73.4754* P less than 0.0136
D.F. = 14 and 2.0000

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Emotional Indicators	0.0769	0.2488	0.6252
2.	Personality A	2.4021	2.1259	0.1655
3.	B	0.2355	0.1521	0.7021
4.	C	0.7426	0.4334	0.5204
5.	D	0.8540	0.3004	0.5917
6.	E	0.7219	0.7655	0.3955
7.	F	4.5084	2.5057	0.1343
8.	G	0.0266	0.0567	0.8150
9.	H	2.4855	1.3447	0.2644
10.	I	0.6474	0.5301	0.4778
11.	J	0.0673	0.0728	0.7911
12.	N	0.0048	0.0058	0.9402
13.	O	1.0976	0.7404	0.4031
14.	Q_4	6.2235	8.6402	0.0102

D.F. for Hypothesis = 1
D.F. for Error = 15
14 covariates had been eliminated

*Null hypothesis rejected at the 5% level

TABLE 31

PLANNED COMPARISON FOR EMOTIONAL TEST ITEMS (YOUNGER): MAIN EFFECT OF PROGRAM - HYPOTHESIS THREE

That no differences exist between the performance on the emotional test items of those children having the Individualized Physical Education Program and those having the Group-Oriented Physical Education Program.

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS
F = 111.6123* P less than 0.0090
D.F. = 14 and 2.0000

Variable	Between Mean Square	Univariate F	P Less Than
1. Emotional Indicators	0.5532	1.7894	0.2010
2. Personality A	1.4936	1.3219	0.2683
3. B	16.7838	10.8378	0.0050
4. C	1.4345	0.8372	0.3747
5. D	0.7815	0.2749	0.6077
6. E	5.1074	5.4154	0.0344
7. F	1.1038	0.6135	0.4457
8. G	1.4239	3.0377	0.1019
9. H	0.0007	0.0004	0.9854
10. I	1.9047	1.5595	0.2309
11. J	1.4454	1.5621	0.2306
12. N	2.9848	3.6560	0.0752
13. O	0.3978	0.2683	0.6121
14. Q_4	2.7432	3.8084	0.0700

D.F. for Hypothesis = 1
D.F. for Error = 15
14 covariates had been eliminated

*Null hypothesis rejected at the 5% level

TABLE 32

EMOTIONAL BEHAVIOR (YOUNGER): INTERACTION EFFECT OF DISABILITY X PROGRAM

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS

F = 3.6302* P less than 0.0439

D.F. = 42 and 6.6983

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Emotional Indicators	1.3671	4.4222	0.0204
2.	Personality A	0.8171	0.7231	0.5538
3.	B	8.5383	5.5135	0.0094
4.	C	1.8884	1.1021	0.3790
5.	D	3.4004	1.1963	0.3449
6.	E	1.6215	1.7193	0.2059
7.	F	1.0865	0.6038	0.6226
8.	G	0.2963	0.6321	0.6057
9.	H	1.8344	0.9924	0.4231
10.	I	0.9483	0.7765	0.5252
11.	J	0.1603	0.1732	0.9129
12.	N	0.4167	0.5104	0.6812
13.	O	0.2847	0.1921	0.9002
14.	Q_4	0.8105	1.1252	0.3703

D.F. for Hypothesis = 3
D.F. for Error = 15
14 covariates had been eliminated

*Null hypothesis rejected at the 5% level

TABLE 33

PLANNED COMPARISON FOR EMOTIONAL TEST ITEMS (YOUNGER): INTERACTION EFFECT OF DISABILITY X PROGRAM - HYPOTHESIS ONE

That no differences exist between the performance on the emotional test items of those children having Special Programsand those having no Special Program.

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS
F = 17.8826 P less than 0.0542
D.F. = 14 and 2.0000

Variable	Between Mean Square	Univariate F	P Less Than
1. Emotional Indicators	0.6655	2.1529	0.1630
2. Personality A	1.5832	1.4012	0.2550
3. B	10.5741	6.8281	0.0196
4. C	1.2895	0.7526	0.3994
5. D	6.6590	2.3426	0.1467
6. E	3.4775	3.6872	0.0741
7. F	0.4250	0.2362	0.6340
8. G	0.1591	0.3395	0.5688
9. H	0.4927	0.2665	0.6132
10. I	1.4919	1.2215	0.2865
11. J	0.0884	0.0955	0.7616
12. N	0.2143	0.2626	0.6159
13. O	0.0006	0.0004	0.9846
14. Q_4	0.1995	0.2770	0.6064

D.F. for Hypothesis = 1
D.F. for Error = 15
14 covariates had been eliminated

TABLE 34

PLANNED COMPARISON OF EMOTIONAL TEST ITEMS (YOUNGER): INTERACTION EFFECT OF DISABILITY X PROGRAM - HYPOTHESIS TWO

That no differences exist between the performance on the emotional test items of those children having a Physical Education Program and those having the Art Program.

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS
F = 123.1066* P less than 0.0081
D.F. = 14 and 2.0000

Variable	Between Mean Square	Univariate F	P Less Than
1. Emotional Indicators	3.5175	11.3786	0.0042
2. Personality A	0.5621	0.4975	0.4915
3. B	2.4088	1.5555	0.2315
4. C	3.7582	2.1934	0.1594
5. D	1.8473	0.6499	0.4328
6. E	0.2258	0.2394	0.6318
7. F	2.6142	1.4530	0.2468
8. G	0.6256	1.3346	0.2661
9. H	4.6841	2.5341	0.1323
10. I	0.2506	0.2052	0.6571
11. J	0.3803	0.4110	0.5312
12. N	0.0352	0.0431	0.8383
13. O	0.1196	0.0807	0.7803
14. Q_4	0.8451	1.1732	0.2959

D.F. for Hypothesis = 1
D.F. for Error = 15
14 covariates had been eliminated

*Null hypothesis was rejected at the 5% level

TABLE 35

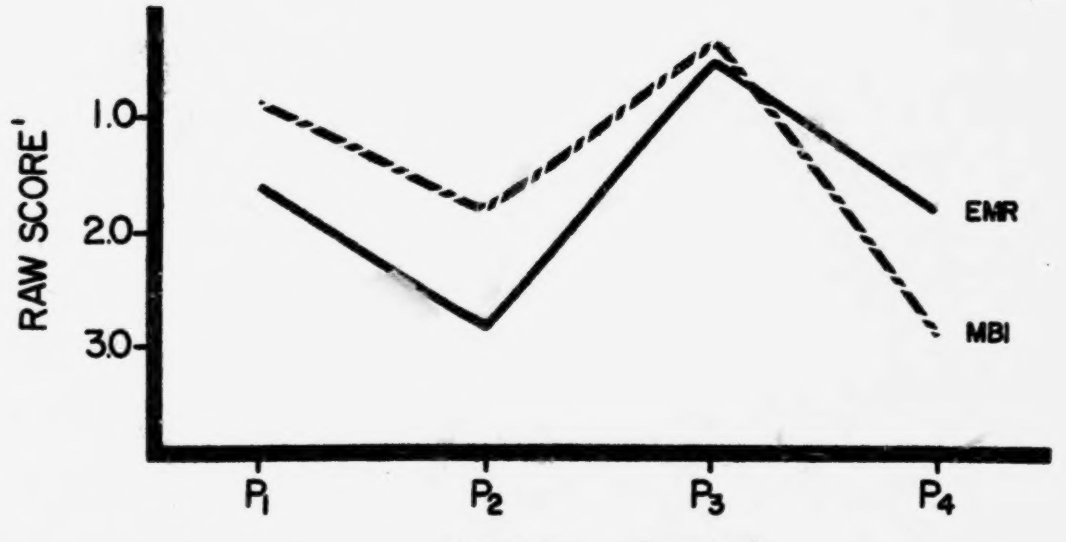
PLANNED COMPARISON FOR EMOTIONAL TEST ITEMS (YOUNGER): INTERACTION EFFECT OF DISABILITY X PROGRAM - HYPOTHESIS THREE

That no differences exist between the performance on the emotional test items of those children having the Individualized Physical Education Program and those having the Group-Oriented Physical Education Program.

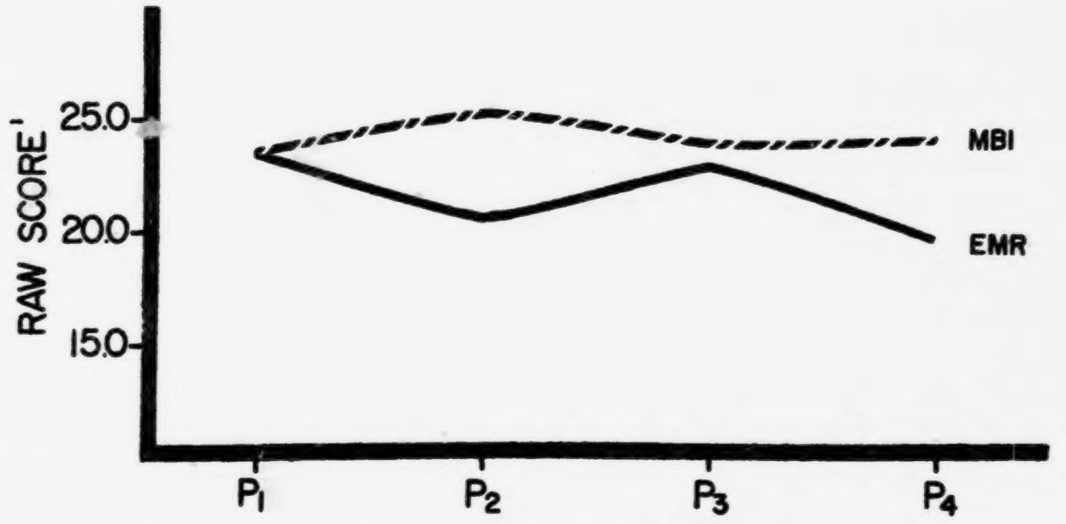
FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS
F = 5.1916 P less than 0.1731
D.F. = 14 and 2.0000

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Emotional Indicators	0.0006	0.0021	0.9643
2.	Personality A	0.0032	0.0029	0.9581
3.	B	4.3576	2.8138	0.1142
4.	C	0.0509	0.0297	0.8655
5.	D	1.9764	0.6953	0.4175
6.	E	0.1623	0.1720	0.6842
7.	F	1.3531	0.7520	0.3995
8.	G	0.0400	0.0854	0.7742
9.	H	0.0074	0.0040	0.9505
10.	I	0.3452	0.2826	0.6028
11.	J	0.0125	0.0135	0.9089
12.	N	0.4925	0.6032	0.4495
13.	O	0.6089	0.4108	0.5313
14.	Q_4	1.0491	1.4565	0.2462

D.F. for Hypothesis = 1
D.F. for Error = 15
14 covariates had been eliminated



FACTOR Q_4 (Tension)



FACTOR B (Intelligence)

FIGURE 19. EMOTIONAL BEHAVIOR' (YOUNGER): Interaction Effect of Disability x Program, for Personality Factors Q_4 (Tension), and B (Intelligence)

P_1 = Individualized Physical Education Program
P_2 = Group Oriented Physical Education Program
P_3 = Art Program
P_4 = Usual Program

'From Adjusted Means

For both factors approximately the same relative positions of adjusted means exist except in the case of the control program. First, it can be seen that the brain injured children hold on the average a superior position to the educable retarded children, and second, the positions of the classes in the individualized program and the art program remain similar for both personality factors. The minimally brain injured children consistently improved more than the educable retarded children with all special programs, although the contribution of Factor Q_4 and Factor B to the significant interaction between disability and program for the last planned comparison (physical education programs versus art programs) is not clear.

Interaction Effect of Disability x Sex x Program

It will be recalled that the multivariate analysis of the data on emotional behavior of the younger children resulted in rejection of the null hypothesis that there was an interaction between disability, sex and program ($F = 4.03$; $P < 0.003$). The results of the multivariate and the univariate analyses are given in Table 36. It is clear that the greatest single contribution fo the significant multivariate F value was made by factor Q_4.

In interpreting the significant second-order interaction effect, two procedures were employed. First, the three planned comparisons were made, and seoond the adjusted means were plotted as shown in Figure 20. Tables 37, 38, and 39 provide information on the results of the multivariate and univariate analyses obtained in the three comparisons. An examination of Table 37 (the first comparison, special programs versus no special program) reveals that the null hypothesis was upheld ($F = 17.279$ $P < 0.056$). It was therefore concluded that for the emotional test items, the effects of the special programs taken collectively in comparison to the effects of the usual program did not vary by disability and sex.

The second comparison (see Table 38) likewise showed that the effects of the physical education programs taken as a whole compared to the effects of the art program were not different for the two disabilities nor were they different for the sexes within disability.($F = 0.458$; $P < 0.851$).

Table 39 shows the results of the testing of hypothesis three, which questioned whether there were differences in performance on the emotional test items between the classes in the individualized physical education program, and those in the group oriented physical education program and whether the differences attributable to program effects varied with disability and sex. The multivariate F of 57.094 with a probability of 0.017 clearly indicated that such differences did exist. Figure 20 shows the relative position of the adjusted means for two personality factors, B and Q_4. These factors, measuring the traits of intelligence and tension have been shown because of the consistency with which they contributed towards the rejection of the null hypothesis on several tests. It is clearly evident from Figure 20 that the effect of the programs on Factor Q_4 varied markedly with disability and sex. The relative position of the adjusted means indicates a superior degree of change favoring the boys rather than the girls, but indicates also the tendency for the

TABLE 36

EMOTIONAL BEHAVIOR (YOUNGER): INTERACTION EFFECT OF DISABILITY X SEX X PROGRAM

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS

F = 4.0255* P less than 0.0334

D.F. = 42 and 6.6983

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Emotional Indicators	0.0768	0.2484	0.8612
2.	Personality A	1.9740	1.7470	0.2005
3.	B	1.5214	0.9824	0.4274
4.	C	0.7198	0.4201	0.7413
5.	D	0.5069	0.1783	0.9095
6.	E	0.8257	0.8755	0.4757
7.	F	0.6974	0.3876	0.7636
8.	G	0.7554	1.6117	0.2286
9.	H	1.6656	0.9011	0.4637
10.	I	0.2043	0.1672	0.9169
11.	J	1.9926	2.1534	0.1362
12.	N	1.4023	1.7177	0.2062
13.	O	0.7338	0.4950	0.6912
14.	Q_4	3.0581	4.2456	0.0233

D.F. for Hypothesis = 3
D.F. for Error - 15

14 covariates had been eliminated

*Null hypothesis rejected at the 5% level

TABLE 37

PLANNED COMPARISON FOR EMOTIONAL TEST ITEMS (YOUNGER): INTERACTION EFFECT OF DISABILITY X SEX X PROGRAM - HYPOTHESIS ONE

That no differences exist between the performance on the emotional test items of those children having Special Programs and those having no Special Program

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECOTRS
F = 17.2789 P less than 0.0561
D.F. = 14 and 2.0000

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Emotional Indicators	0.1006	0.3255	0.5768
2.	Personality A	1.4353	1.2702	0.2775
3.	B	3.0928	1.9971	0.1781
4.	C	0.2061	0.1203	0.7336
5.	D	1.3763	0.4842	0.4972
6.	E	1.8977	2.0121	0.1765
7.	F	0.3449	0.1917	0.6678
8.	G	0.4202	0.8964	0.3588
9.	H	0.4202	0.8964	0.6621
10.	I	0.5464	0.4474	0.5138
11.	J	0.9320	1.0071	0.3316
12.	N	3.0026	3.6778	0.0744
13.	O	0.1520	0.1025	0.7533
14.	Q_4	2.7929	3.8775	0.0677

D.F. for Hypothesis = 1
D.F. forError = 15
14 covariates had been eliminated

TABLE 38

PLANNED COMPARISON FOR EMOTIONAL TEST ITEMS (YOUNGER): INTERACTION EFFECT OF DISABILITY X SEX X PROGRAM - HYPOTHESIS TWO

That no differences exist between the performance on the emotional test items of those children having a Physical Education Program and those having the Art Program.

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS
F = 0.4580 P less than 0.8505
D.F. = 14 and 2.0000

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Emotional Indicators	0.0927	0.3000	0.5920
2.	Personality A	2.6784	2.3704	0.1445
3.	B	0.3583	0.2313	0.6375
4.	C	1.9419	1.1333	0.3040
5.	D	0.0675	0.0237	0.8796
6.	E	0.1754	0.1860	0.6725
7.	F	0.6984	0.3882	0.5427
8.	G	0.2005	0.4278	0.5230
9.	H	1.2654	0.6846	0.4210
10.	I	0.0123	0.0100	0.9216
11.	J	0.0006	0.0006	0.9807
12.	N	1.4826	1.8161	0.1978
13.	O	0.2490	0.1680	0.6878
14.	Q_4	0.0081	0.0113	0.9169

D.F. for Hypothesis = 1
D.F. for Error = 15
14 covariates have been eliminated

TABLE 39

PLANNED COMPARISON FOR EMOTIONAL TEST ITEMS (YOUNGER): INTERACTION EFFECT OF DISABILITY X SEX X PROGRAM - HYPOTHESIS THREE

That no differences exist between the performance on the emotional test items of those children having the Individualized Physical Education Program and those having the Group-Oriented Physical Education Program.

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS
F = 57.0942* P less than 0.0174
D.F. = 14 and 2.0000

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Emotional Indicators	0.0053	0.0171	0.8978
2.	Personality A	2.3513	2.0809	0.1698
3.	B	1.8418	1.1893	0.2927
4.	C	0.0961	0.0561	0.8160
5.	D	0.0268	0.0094	0.9240
6.	E	0.6086	0.6453	0.4344
7.	F	0.6869	0.3818	0.5460
8.	G	1.8537	3.9547	0.0654
9.	H	2.6212	1.4181	0.2523
10.	I	0.1306	0.1069	0.7482
11.	J	5.6127	6.0655	0.0264
12.	N	0.1578	0.1933	0.6665
13.	O	1.9593	1.3220	0.2683
14.	Q_4	4.9677	6.8968	0.0191

D.F. for Hypothesis = 1
D.F. for Error = 15
14 covariates had been eliminated

*Null hypothesis was rejected at the 5% level

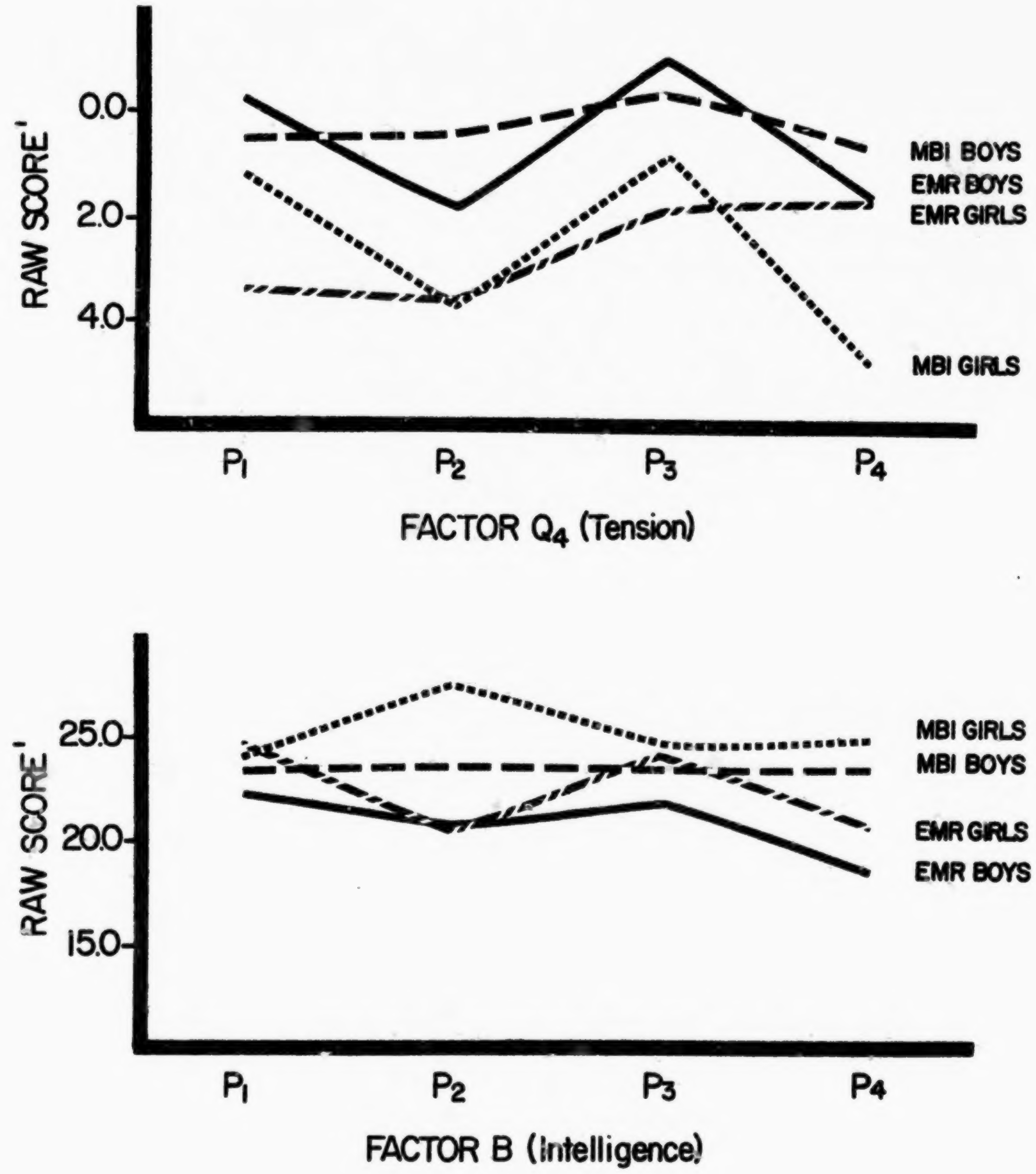


FIGURE 20. EMOTIONAL BEHAVIOR' (YOUNGER): Interaction Effect of Disability x Sex x Program, for Personality Factors Q$_4$ (Tension), and B (Intelligence)

P$_1$ = Individualized Physical Education Program
P$_2$ = Group Oriented Physical Education Program
P$_3$ = Art Program
P4 = Usual Program

'From Adjusted Means

difference to be in favor of the minimally brain injured children, rather than the educable retarded. This suggests that regardless of the treatment the boys were improving their position more than the girls in this trait, although it is evident that among the treatments the art program appeared to be more effective than the others.

Main Effect of Disability

An examination of Table 40 reveals that disability was a factor which accounted for differences in the performance of the children for the vector of variables which assessed emotional behavior. ($F = 40.00$; $P < 0.025$). In other words, the changes in performance of the brain injured children on the emotional behavior test items taken collectively differed significantly from the performance of the retarded children. It should be noted that the only significant univeriate F was for Factor B ($P < 0.002$). This was the only factor contributing significantly to the multivariate F. The adjusted means of the two disability groups are graphically shown in Figure 21 for both Factor Q_4 and Factor B. It will be noted that on Factor B (intelligence) that the adjusted mean of the brain injured children is higher than that of the retarded children. Over the period of the experiment the former made greater gains than the latter in this trait.

Main Effect of Sex

The results of the multivariate analysis examining the effect of sex on the changes in emotional behavior of the classes of children is given in Table 41. As is indicated in the table the null hypothesis was rejected ($F = 25.75$; $P < 0.038$). Interestingly, this was the only hypothesis for which sex proved to be a significant factor. Reference to Table 41 shows that only two factors had significant univeriate F's namely Factor G and Factor Q_4. Although the univeriate F for Factor B was not significant the means for this Factor and means for Factor Q_4 are graphically shown in Figure 22. The adjusted means of Factor Q_4 favor the boys over the girls. It would appear that over the period of the study, tension reduction as assessed by this test was greater for the boys than for the girls. The direction of the change for Factor G was also examined. The change likewise favored the boys. It would seem, therefore, that the differential rate of change in emotional behavior was more pronounced for the boys than for the girls.

The Characteristics of the Older Children

Interaction Effect of Disability x Program

Only one of the seven hypotheses tested for the older children was rejected. This was the interaction effect of disability x program. From Table 42, it can be seen that the null hypothesis was rejected at the 5% level ($P < 0.036$).

By examining Tables 43, 44, and 45 it can be seen that none of the three planned comparisons showed significant differences. Each null hypotheses was upheld. It is evident that the interaction between disability

TABLE 40

EMOTIONAL BEHAVIOR (YOUNGER): MAIN EFFECT OF DISABILITY

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS

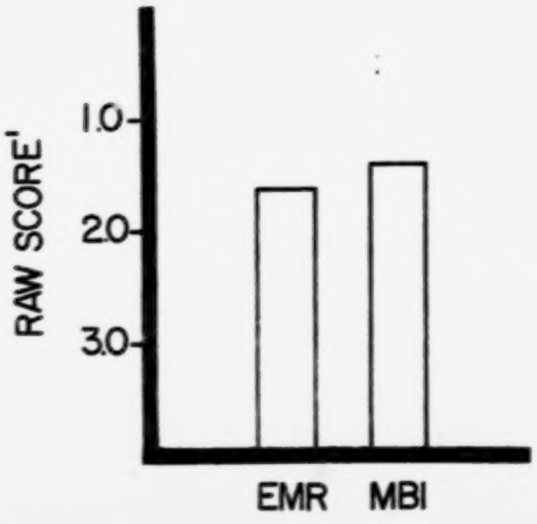
F = 40.0004*   P less than 0.0247

D.F. = 14 and 2.0000

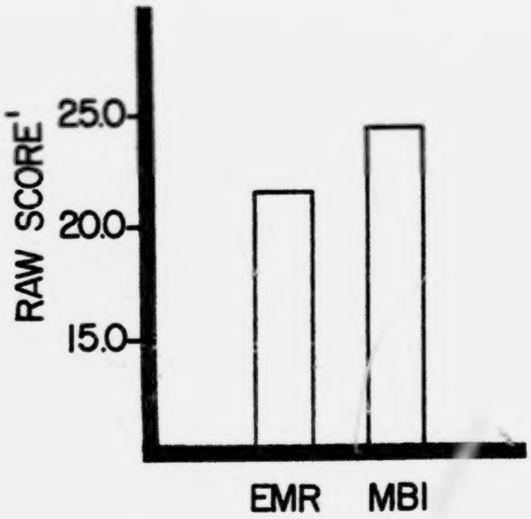
	Variable	Between Mean Square	Univariate F	P Less Than
1.	Emotional Indicators	0.0011	0.0034	0.9540
2.	Personality A	0.0042	0.0037	0.9524
3.	B	23.5378	15.1991	0.0015
4.	C	1.9177	1.1192	0.3069
5.	D	1.0898	0.3834	0.5451
6.	E	0.5401	0.5727	0.4610
7.	F	0.0560	0.0311	0.8624
8.	G	0.0845	0.1803	0.6772
9.	H	0.8087	0.4375	0.5184
10.	I	0.5769	0.4724	0.5024
11.	J	0.2103	0.2272	0.6405
12.	N	0.3723	0.4560	0.5098
13.	O	0.0021	0.0014	0.9706
14.	Q_4	0.0260	0.0361	0.8518

D.F. for Hypothesis = 1
D.F. for Error = 15
14 covariates had been eliminated

*Null hypothesis rejected at the 5% level



FACTOR Q_4 (Tension)



FACTOR B (Intelligence)

FIGURE 21. EMOTIONAL BEHAVIOR' (YOUNGER): Main Effect of Disability, for Personality Factors Q_4 (Tension), and B (Intelligence)

'From Adjusted Means

TABLE 41

EMOTIONAL BEHAVIOR (YOUNGER): MAIN EFFECT OF SEX

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS

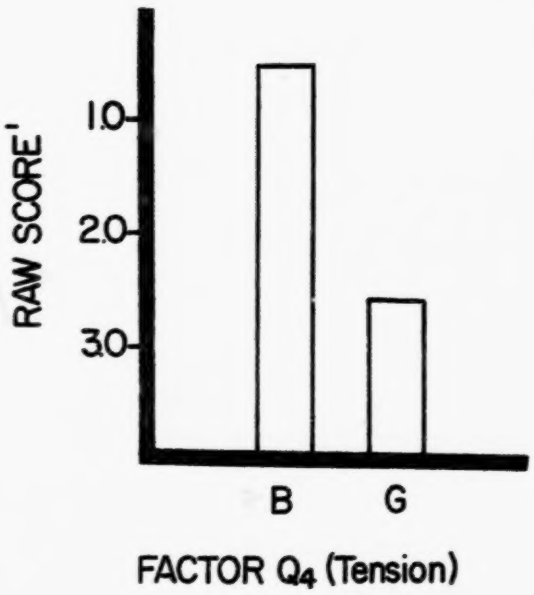
F = 25.7527* P less than 0.0380

D.F. = 14 and 2.0000

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Emotional Indicators	0.2032	0.6575	0.4302
2.	Personality A	0.0555	0.0491	0.8276
3.	B	3.1202	2.0148	0.1763
4.	C	0.0452	0.0264	0.8731
5.	D	1.4588	0.5132	0.4828
6.	E	0.2333	0.2473	0.6262
7.	F	0.4731	0.2629	0.6156
8.	G	2.1245	4.5325	0.0503
9.	H	0.0291	0.0157	0.9019
10.	I	0.6209	0.5084	0.4868
11.	J	0.0002	0.0003	0.9873
12.	N	0.0643	0.0787	0.7829
13.	O	1.2240	0.8257	0.3779
14.	Q_4	7.2162	10.0184	0.0065

D.F. for Hypothesis = 1
D.F. for Error = 15
14 covariates had been eliminated

*Null hypothesis rejected at the 5% level



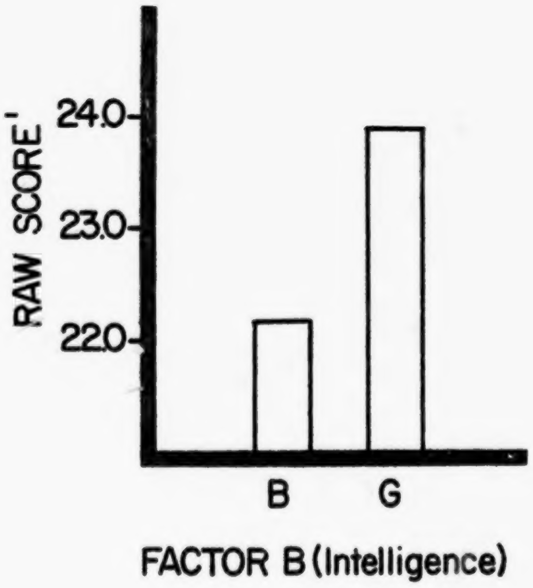


FIGURE 22. EMOTIONAL BEHAVIOR' (YOUNGER): Main Effect of Sex, for Personality Factors Q_4 (Tension), and B (Intelligence)

' From Adjusted Means

TABLE 42

EMOTIONAL BEHAVIOR (OLDER): INTERACTION EFFECT OF DISABILITY X PROGRAM

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS

F = 2.1767* P less than 0.0364

D.F. = 42 and 18.5642

Variable	Between Mean Square	Univariate F	P Less Than
1. Emotional Indicators	0.0704	0.2416	0.8663
2. Personality A	0.3197	0.5001	0.6867
3. B	3.0236	3.6099	0.0324
4. C	0.6111	1.0148	0.4081
5. D	0.2476	0.4067	0.7500
6. E	2.3229	2.3992	0.0998
7. F	2.1805	2.4133	0.0985
8. G	0.5622	1.1380	0.3591
9. H	1.7917	3.2324	0.0455
10. I	4.2945	3.4173	0.0384
11. J	1.8066	2.6595	0.0776
12. N	0.0447	0.0486	0.9854
13. O	0.5398	0.7876	0.5157
14. Q_4	0.4217	0.3681	0.7769

D.F. for Hypothesis = 3
D.F. for Error = 19
14 covariates had been eliminated

*Null hypothesis rejected at the 5% level

TABLE 43

PLANNED COMPARISON OF EMOTIONAL TEST ITEMS (OLDER): INTERACTION EFFECT OF DISABILITY X PROGRAM - HYPOTHESIS ONE

That no differences exist between the performance on the emotional test items of those children having Special Programs and those having no Special Program.

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS
F = 3.3309 P less than 0.0735
D.F. = 14 and 6.0000

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Emotional Indicators	0.0152	0.0523	0.8217
2.	Personality A	0.3263	0.5104	0.4837
3.	B	4.9737	5.9365	0.0249
4.	C	0.0950	0.1577	0.6958
5.	D	0.0931	0.1529	0.7001
6.	E	4.3764	4.5203	0.0469
7.	F	4.0527	4.4854	0.0476
8.	G	0.1214	0.2456	0.6259
9.	H	0.7746	1.3974	0.2518
10.	I	8.6958	6.9196	0.0165
11.	J	0.0086	0.0126	0.9118
12.	N	0.1381	0.1502	0.7027
13.	O	0.1703	0.2484	0.6239
14.	Q4	0.5209	0.4547	0.5083

D.F. for Hypothesis = 1
D.F. for Error = 19
14 covariates have been eliminated

TABLE 44

PLANNED COMPARISON OF EMOTIONAL TEST ITEMS (OLDER): INTERACTION EFFECT OF DISABILITY X PROGRAM - HYPOTHESIS TWO

That no differences exist between the performance on the emotional test items of those children having a Physical Education program and those having the Art Program.

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS
F = 3.2341 P less than 0.0783
D.F. = 14 and 6.0000

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Emotional Indicators	0.0690	0.2367	0.6322
2.	Personality A	0.3615	0.5654	0.4613
3.	B	2.8490	3.4005	0.0809
4.	C	1.8136	3.0115	0.0989
5.	D	0.2070	0.3401	0.5667
6.	E	4.2961	4.4373	0.0487
7.	F	1.8152	2.0091	0.1726
8.	G	0.1404	0.2842	0.6002
9.	H	0.6107	1.1018	0.3071
10.	I	0.7408	0.5895	0.4521
11.	J	2.8616	4.2128	0.0542
12.	N	0.0006	0.0007	0.9794
13.	O	0.6882	1.0041	0.3290
14.	Q4	0.1367	0.1193	0.7336

D.F. for Hypothesis = 1
D.F. for Error = 19
14 covariates had been eliminated

TABLE 45

PLANNED COMPARISON OF EMOTIONAL TEST ITEMS (OLDER): INTERACTION EFFECT OF DISABILITY X PROGRAM - HYPOTHESIS THREE

That no differences exist between the performance on the emotional test items of those children having the Individualized Physical Education Program and those having the Group-Oriented Physical Education Program.

FOR MULTIVARIATE TEST OF EQUALITY OF MEAN VECTORS
F = 2.7080 P less than 0.1136
D.F. = 14 and 6.0000

	Variable	Between Mean Square	Univariate F	P Less Than
1.	Emotional Indicators	0.0824	0.2829	0.6010
2.	Personality A	0.0411	0.0642	0.8027
3.	B	2.4777	2.9573	0.1018
4.	C	0.0402	0.0667	0.7990
5.	D	0.4849	0.7965	0.3833
6.	E	0.1866	0.1927	0.6657
7.	F	2.2999	2.5455	0.1272
8.	G	1.2324	2.4944	0.1308
9.	H	4.5398	8.1900	0.0100
10.	I	3.3298	2.6496	0.1201
11.	J	2.4780	3.6480	0.0714
12.	N	0.0030	0.0033	0.9551
13.	O	0.4065	0.5932	0.4507
14.	Q_4	0.8092	0.7064	0.4111

D.F. for Hypothesis = 1
D.F. for Error = 19
14 covariates had been eliminated

and program for the older children was not an effect which gave useful information in answering the questions posed in this study.

Discussion

In assessing the emotional behavior of the educable mentally retarded children, and the minimally brain injured children two tests were used, The Bender test and Cattell's personality questionnaires. Separate but identical analyses for the younger, and the older children were carried out, and for each age level seven hypotheses were tested. The results of the several multivariate analyses may be summarized as follows:

1. The effect of program on the measures of emotional behavior taken collectively was statistically significant for the younger, but not for the older children. Its influence on the younger children was positive particularly for Factor B (intelligence) and Factor Q_4 (tension). Those in the special programs made greater gains than those in the control program, those in the art program showed greater gains than those in the physical education programs, and those in the individualized physical education program improved more than those in the group oriented program.

2. Changes in the measured aspects of emotional behavior of the younger children were different for the two sexes. Improvement was made by the boys on Factor Q_4 (tension reduction). The girls, on the other hand showed that on Factor B, Intelligence, their rate of improvement was superior to that of the boys.

3. For the younger children, changes in performance in the direction of more acceptable emotional behavior was characteristic of the minimally brain injured children rather than of the retarded children.

The results reported above can at best be regarded as tentative. While some consistency was noted between changes that occurred for this and other parameters of behavior, the difficulty with which the personality questionnaire was handled by the younger children should be borne in mind.

It is perhaps worthwhile to propose possible reasons why differences occurred in the younger children and not in the older children on this parameter of behavior. One can, for example, suppose that with increasing chronological age, several aspects of the personality of children are not easily altered. In spite of the fact that the oldest children in the research were only thirteen, it would well be that some stability in personality was already established.

A second point would be to reiterate a comment made earlier in this report, that inasmuch as change was to occur, the degree to which it was measured was largely a matter of the precision, or sophistication of the test.

By examining Figures 23 and 24, which show the pre- and post-test mean scores for two personality characteristics, support can be shown for the results previously reported. For each trait, tension and intelligence, the younger children changed the degree and direction of their scores much more than the older children. The best example of this is for Factor B, where for each of the four cells, the pre-and post-test scores for each program, for boys and girls, and for both disabilities, are clustered. The scores of the younger children, on the same factor are not nearly as close together.

It can be seen from Figure 24 that change occurred sharply in the tension (Factor Q_4) of the children. The direction of the change was not consistent. A remarkable and unexplainable change in position occurred for the younger minimally brain injured children who were not involved in any of the special programs. According to the results, these girls changed from one end of the bipolar scale to the other end. This is probably a reflection of the very small number of girls in the group and the variability in their response patterns.

In summary, the following general observations are in order.

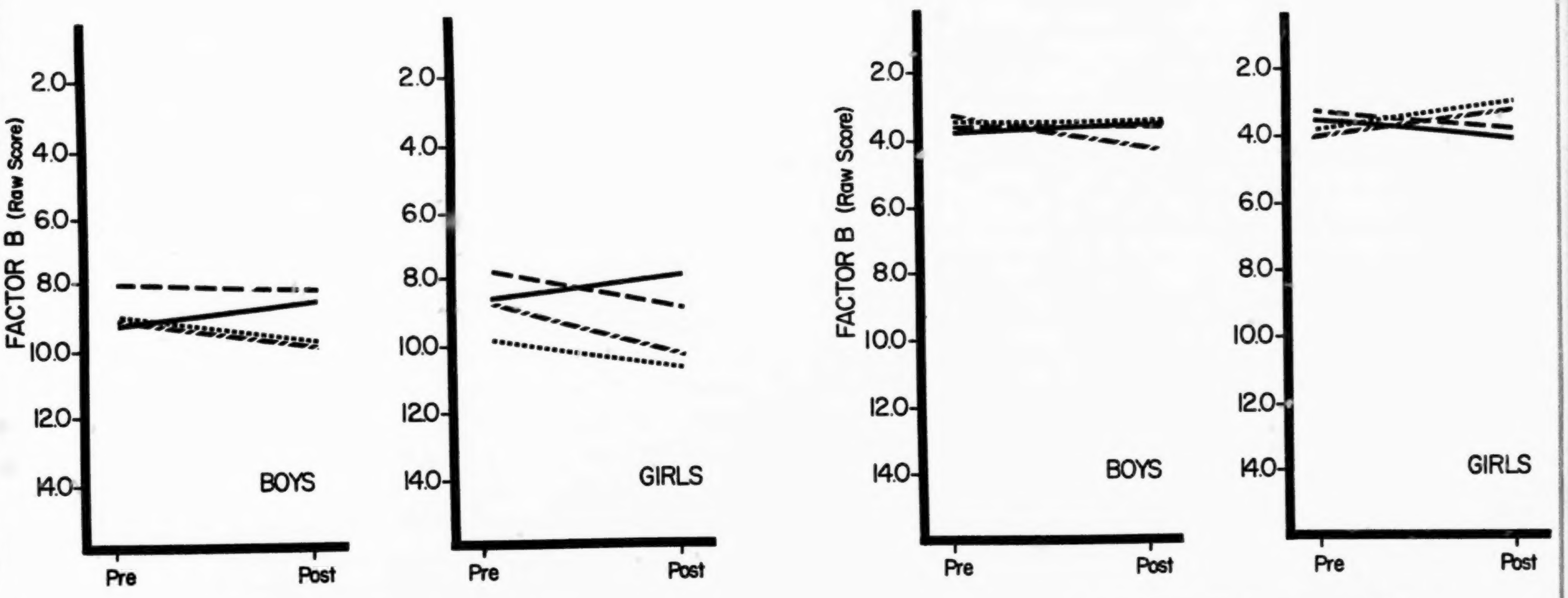
1. Measured changes in aspects of the emotional characteristics of the children were consistently demonstrated for only two of fourteen test items. In general positive changes in the intelligence of the children were shown. It appeared also that many of the children became more composed and relaxed as a result of the program. Whether this trait is desirable or not seems an individual matter. The opinions of the teachers indicated that the trend was toward more socially acceptable patterns of behavior as the special programs progressed. This would suggest that the degree of tension--composure exhibited by classes in the experimental programs resulted in improved classroom behavior.

2. The behavioral changes (positive) were more evident in the younger children than in the older children.

3. Changes in the assessed measures of emotional behavior did not appear to be obviously or consistently in favor of the boys or the girls.

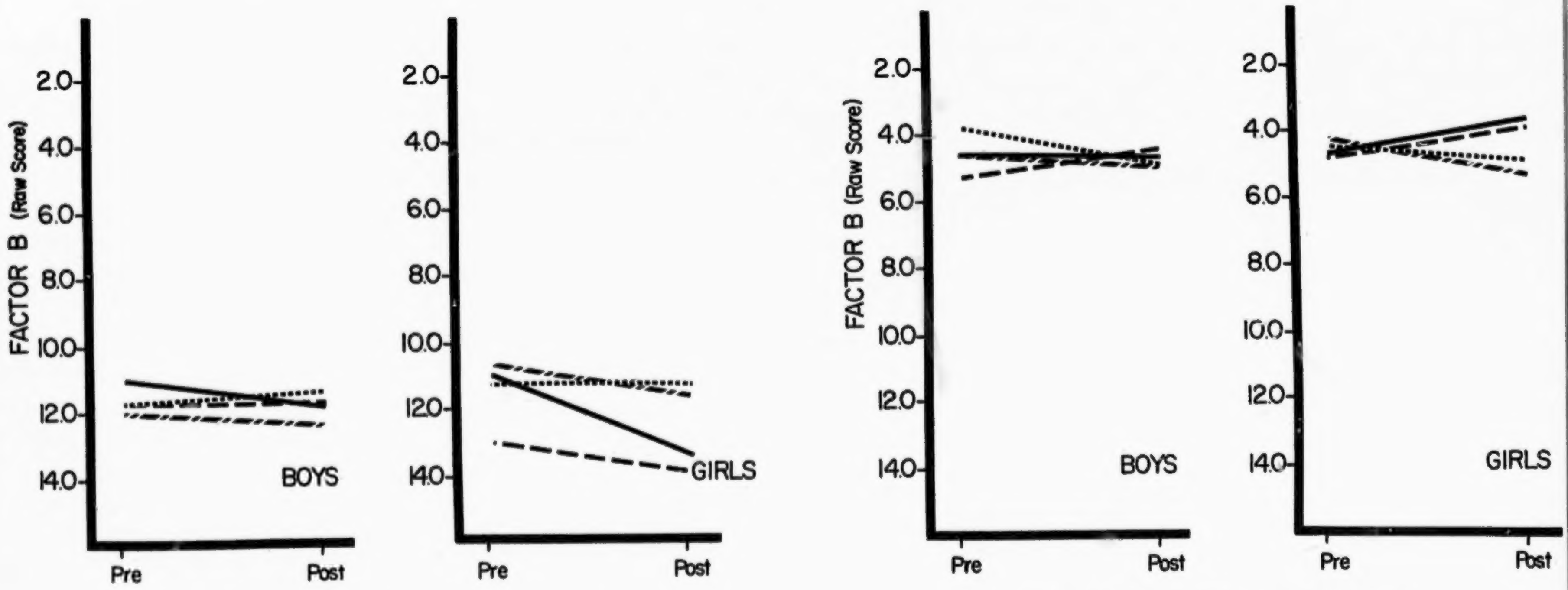
4. The personality characteristics of the minimally brain injured changed in a more positive manner than did those of the educable mentally retarded children.

5. It was demonstrated that the special experimental programs were more successful at eliciting positive change in some aspects of the emotional behavior of the children than the non-special program. In general, the art program was the most successful program in this regard. Of the two physical education programs, the individualizdd program appeared to elicit more positive changes than the program that was oriented towards the group.



YOUNGER EDUCABLE RETARDED

OLDER EDUCABLE RETARDED



YOUNGER MINIMALLY BRAIN INJURED

OLDER MINIMALLY BRAIN INJURED

FIGURE 23. MEAN PRE AND POST TEST SCORES FOR PERSONALITY FACTOR B (Intelligence), BY TREATMENT ACCORDING TO DISABILITY, AGE, AND SEX

INDIVIDUALIZED P. E. PROGRAM -·-·-·-
GROUP ORIENTED P. E. PROGRAM — — —
ART PROGRAM ··········
USUAL PROGRAM ———

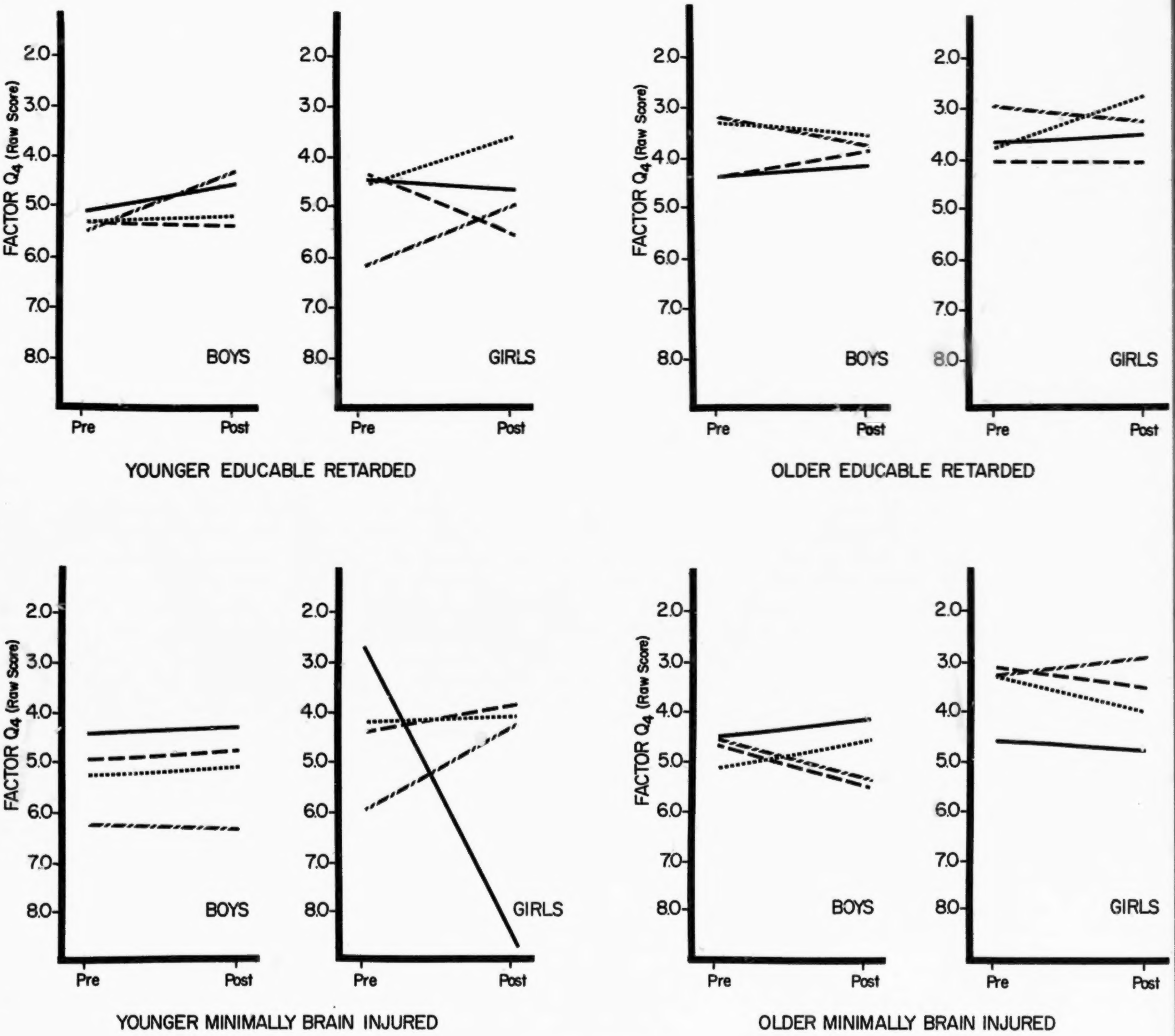


FIGURE 24. MEAN PRE AND POST TEST SCORES FOR PERSONALITY FACTOR Q_4 (Tension), BY TREATMENT ACCORDING TO DISABILITY, AGE, AND SEX

INDIVIDUALIZED P. E. PROGRAM -·-·-·-·-
GROUP ORIENTED P. E. PROGRAM — — — —
ART PROGRAM ··············
USUAL PROGRAM ————————

General Discussion of the Findings

The premise that changes in some aspects of the behavior of educable mentally retarded children, and minimally brain injured children in elementary school special education classes can be elicited was supported by this research. Where changes occurred, they were toward behaviors which are well-regarded in society.

Changes attributable to the planned physical activity programs occurred in three of the five parameters of behavior. While differential changes in the performance of the children on the strength test items were not altogether expected, changes were anticipated in the measured aspects of social behavior. Significant changes in the latter did not occur.

It had been reported by classroom teachers that positive changes in social behavior did occur. It appeared that children became more "at east" and "outgoing." Since the Cowell Social Behavior Trend Index measured outgoing social behavior, positive changes in scores on this test were expected for those included in the experimental programs.

The children in the experimental programs were given a great deal of attention. Specially planned lessons, new equipment, and successful learning experiences could reasonably be expected to affect the way the children felt about themselves, and acted towards others in the class.

The design of the study included four factors, program, disability, chronological age, and sex. While the focus of the research was on the effects of different types of programs, the possible influence of the other three factors could not be ignored.

Differential changes in behavior related to the special treatments (programs) were noted in the motor, intellectual, and emotional parameters of behavior. Of the twenty-three variables which were selected to measure the motor, intellectual, and emotional parameters of behavior, eight variables consistently worked in identifying differential changes in behavior. These variables were:

Motor Performance	- Arm Hang
	- Sit-Ups
	- Broad Jump
	- Ball Throw
Intellectual Behavior	- Peabody Picture Vocabulary Test
	- Bender Motor Gestalt Test
Emotional Behavior	- Factor B - Intelligence
	- Factor Q_4 - Tension

The children in the study were in classes for the educable mentally retarded, or the minimally brain injured. For each of the three parameters of behavior a distinct and consistent difference occurred between the behavioral changes of the brain injured children in comparison with the retarded children. At the end of the research, even allowing for differences between pre-test scores, the minimally brain injured children demonstrated superior performance changes in most of the measured traits.

In several ways the above mentioned result was surprising and unexpected. In the first place, the inclusion of the children in the special educational treatment programs involved changes in routine. The programs--physical education and art, involved the children in a spatial orientation to which they were unfamiliar, and from which it was expected that difficulties might arise. Many authorities in special education hold the view that these children need a tightly-structured school routine, where contact with others in the class is limited. The partitioned classroom is seen as a mechanism for excluding undesirable and distracting stimuli. This research did not intend to question or test this theory, but the inclusion of these children into one of the three experimental programs made it necessary for these children to work away from the cubicles. Secondly, it had been expected that differential changes would favor the educable retardates. The level of intellectual ability of these children is limited, and it was thought that those with the greatest initial deficits in motor performance, measured intelligence, or emotional traits, might reasonably be expected to show the greatest gains. This did not occur. Despite the improved scores of the retarded children, superior change was demonstrated by the minimally brain injured children. A third reason was because of the experience of those in special education in the three school districts in their work with the brain injured. Although of superior intellectual ability, it had been noted that despite excellent programs, the classroom achievement tended to regress with time, toward the level of the educable retardates. It could therefore be expected that a program which lasted for some six months might be subject to a decline rather than an improvement in performance.

The range of the chronological age of the children was from six to thirteen years; the vast majority of the children were from seven to twelve years of age. Because it is well known that chronological age is a factor of considerable consequence in affecting many abilities in childhood the children were placed into one of two age groups. The "younger" children were from six to nine years old, and the "older" children were from ten to thirteen years of age. Although the level of performance on most tests is superior for older children, there seemed few reasons to suggest that the research might elicit changes in performance that differed for children of different ages. Differential change, however, did occur. For the motor and intellectual parameters of behavior, changes favored the "older" children. On the other hand, changes favoring the younger children were found for the emotional parameter of behavior.

Reasons have been given to explain why changes were noted for the emotional test items. The possible variability or inconsistency in response shown by the younger children could have resulted in differential changes in behavioral response. On the other hand, the older children might have been more resistant to changes other than those attributable to maturation, simply because they exhibited more stable personality characteristics. It could be expected that if changes were to favor one age group, then they would consistently favor the younger children. For the motor, and intellectual parameters of behavior, the reverse occurred. The fact that the older children did make noteworthy changes (changes attributable to the special programs) provides rather concrete evidence that regression in performance does not need to happen to the older children in special education classes.

It is perhaps important to note that the response of the boys and girls to the treatments was not materially different. In only one parameter of behavior was sex a significant factor as either a main effect or interaction effect. The effect of sex on the measures of emotional behavior of the children were in a sense conflicting. While the girls shared the greater gains in the intelligence factor, the reverse was true for Factor Q_4 (tension). Factor G, which is assumed to measure conscientiousness, showed greater changes for the boys than for the girls. The reasons for the variability in change noted here is not known. There is little to make one believe that the programs brought about differential changes in emotional behavior for the two sexes.

The main purpose of the research was upon the role of the educational physical activity programs in modifying selected aspects of behavior. The three questions posed were concerned with differences between classes involved in:

1. Special Programs Versus The Usual Instructional Program

2. Physical Education Versus Art

3. Individualized Versus Group Oriented Physical Education

Differential changes were found in the motor, intellectual, and emotional parameters of behavior.

For each of the three parameters of behavior,[2] the answer to the first question was a positive one. Differential changes occurred between the classes. On each occasion the changes in performance were over and above those that could be attributed to maturation (shown by the classes not involved in a special program).

The second question which the research sought to answer concerned the comparative effect of physical education versus art in eliciting measurable changes. Of the three parameters of behavior where differential change was statistically significant, only one was in favor of the physical education programs. Such changes occurred in the motor performance of the children. It is important to note that the physical education programs did not include at any time the test items, as was the case in several other investigations. The programs were designed to provide a wide range of movement experiences which are important in the motor development of children. It was planned that the children should make progress towards what some people have termed physical wisdom. It was not altogether unexpected that the physical education experiences might have some carry-over value. One can but assume that more difficult or complex tasks can be acquired only when a good basis of experiences in movement exists.

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[2] For motor performance items $P < 0.108$.

For the emotional test items the position of the classes involved in the art program at the end of the experimental period was superior to that of the classes following the physical education programs. This occurred only for the younger children. The two test items which appeared to be contributing the greatest were the personality characteristics of intelligence and tension (low tension state). It appears that the art program elicited greater changes in these aspects of behavior than the physical education programs. The art program seemingly provided the children with an atmosphere which was conducive to developing improved patterns of emotional behavior.

In view of earlier research which had shown positive effects of physical activity programs in the intelligence of retarded children, it is interesting to note that in the present investigation the changes in performance on the Peabody and the Bender tests were not different for the children in the physical education programs in comparison with those in the art program. Previous research has attempted unsuccessfully to include an experimental group in the design to counter the effects which the research might elicit which were attributable to factors other than those being studied. In the present study since all of the three programs were specially planned, and because equal attention was given to all programs, any differences between these programs could be attributed to the peculiar nature of the program, in this case to physical education or to art. For the motor performance items, the difference favoring the physical education programs can be attributed to the nature of these programs, as opposed to the art program. The emotional parameter of behavior (younger children only) produced results in favor of the art program as compared with the physical education program. Clearly, the Hawthorne effect was operating, but the direction of its effect was different for the three parameters of behavior under consideration.

Perhaps one can conclude that physical education and art programs are both of importance in modifying (improving) certain aspects of behavior of these children. It is suggested that other programs for which easily identifiable child objectives are present, and in which progress is linked with feelings of achievement and success, might be equally successful in this regard.

A third question of the research centered upon the social organization of the children within the class. For each of the three parameters of behavior, the position of the classes who participated in the individualized program was superior to that of the classes involved in the group oriented physical education program. It appears that individual attention is vital in providing for optimal performance. The same point, however, may be described in a different way. In a program where the focus is upon the individual rather than the group, the objectives and the explanation of an activity can be modified or reworded for an individual so that the vast individual differences in ability and performance can be taken into account. When a child is a part of a group activity then some personal identity, some attention has been lost; the group is like an umbrella in that several individuals are brought together under a common label. On the other hand children must learn to function in a social group. Unfortunately, methods of measuring the interaction of children in social groups have not reached the point of refinement where adequate assessments of this parameter of behavior can be made, particularly with the type of children included in this study. The results described above are obviously limited by the measures employed. Conceivably positive social changes occurred in the children in the group oriented programs which were not assessed, changes which may well have been more significant than those noted in the individualized program.

CHAPTER FOUR

SUMMARY AND CONCLUSIONS

Summary

This investigation sought to assess the role of educational physical activity programs in the modification of the motor, intellectual, social, and emotional behavior of educable mentally retarded children, and minimally brain injured children of elementary school age.

Previous research has indicated that changes in measured intelligence and in motor performance occurs when physical activity lessons are added to the daily school schedule of mentally retarded children. Difficulties in the research design and in the treatment of the data has made it difficult to interpret these results.

The present research set out to answer three major questions:

1. What are the differential effects on the motor, intellectual, social and emotional development of children who follow a special experimental program (one of two types of physical activity programs or an art program) compared with those who pursue their usual classroom instructional program?
2. Are there differences in the motor, intellectual, social, and emotional development of children who follow special physical education programs, compared with those included in an art program?
3. What differences are there in the motor, intellectual, social, and emotional development of children in an individual physical education program compared with those in a group-oriented physical education program?

In answering the above questions, due consideration was given to the effects of disability, chronological age and sex.

Forty-nine classes of EMR and MBI children from the Pasadena, Galena Park, and Deer Park Independent School Districts of Harris County, Texas participated in twenty weeks of instructional programs. Of the 481 children who completed the programs, 275 were educable retarded children and 206 were minimally brain injured children.

The design of the study required that four treatments or programs of instruction be used. Of the four treatments, two involved special physical activity programs, the one being individually oriented, the other group oriented. A third treatment was an art program, included to assess the Hawthorne effect. The fourth treatment served as an experimental control, the usual instructional program. Classes were randomly assigned by disability and age to one of the four treatments.

To measure the motor, intellectual, social, and emotional behavior of the children, the following battery of tests was administered prior to and at the conclusion of the application of the treatments:

Motor Performance:	Modified AAHPER Test Battery Strength of right and left grip; pull and thrust
Intellectual Behavior:	Peabody Picture Vocabulary Test
	Bender Motor Gestalt Test
Social Behavior:	Cowell Social Behavior Trend Index
	Sociometric Techniques giving Scores for Acceptance and Rejection
Emotional Behavior	A Cattell Personality Questionnaire
	Emotional Indicators from the Bender Test

The experimental programs were taught for approximately thirty-five minutes every day for twenty weeks, by the classroom teachers who had been prepared for the teaching and testing programs through in-service meetings. The experimental programs were supervised by the investigator, who consulted with each teacher every week, in person.

The construction of the experimental programs was of particular importance since the length of the project was such that the teaching material had to be worthwhile and stimilating. The stress of each special program was such that the experiences afforded to the children were educational. Not only were the children to be in active pursuit of the task at hand, but the knowledge and understanding of what the children were doing was of import. Knowledge of the practice of physical activity is sufficiently advanced that it was known that motor or physiological parameters are best improved through work of a specific rather than a general nature. It was the concomitant learnings which were stressed in this research.

The special art program was included to control for the Hawthorne effect. It is emphasized that the involvement of the classes in the art program was one which was not seen by the children as fulfilling a secondary role. This program was planned and supervised with equal thought as that of the physical education programs.

The treatment of the data was by multivariate analysis of covariance. Where significant F values occurred for the hypotheses for the main effects and interaction effects, the direction of the differences was examined in the following way. When the difference was with a factor of two levels (disability), the direction of the difference was determined by examining the adjusted means of the variables which appeared to be affecting the multivariate F value the most. Where the differences were with the four level factor (program), a procedure of planned comparisons provided information which could itself be supplemented by an examination of the adjusted means.

Conclusions

Subject to the limitations described in the body of the report, the following conclusions would appear to be warranted:

1. Special treatment in the way of well designed programs of physical education or art elicited greater changes in motor, intellectual and emotional behavior of retarded and brain injured children than occurred from the usual instructional program.

2. Of the specially planned experimental programs the physical education programs demonstrated a superior role in modifying motor performance, the art program indicated a superior role in modifying emotional behavior of the younger children, and the programs played a similar role in modifying the intellectual behavior of the children.

3. The physical education program which was oriented towards the individual rather than the group was more successful in eliciting change in the motor, intellectual, and emotional parameters of the behavior of the children.

4. Positive changes in behavior were shown more by the older than the younger children, more frequently by the brain injured than the retarded children, and appeared more likely to occur in the boys than the girls.

BIBLIOGRAPHY

BIBLIOGRAPHY

1. A.A.H.P.E.R., *Youth Fitness Test Manual*, (P. Hunsicker, Director), Washington, D.C.: American Association for Health, Physical Education, and Recreation, 1965.

2. A.A.H.P.E.R., *Special Fitness Test Manual for the Mentally Retarded*, Washington, D. C.: American Association for Heatlh, Physical Education, and Recreation, 1968.

3. Andrews, G., Saurborn, J., Schneider, E., *Physical Education for Today's Boys and Girls*, Boston: Allyn and Bacon, 1960.

4. Asmussen, E., and Heeboll, N. K., "Physical Performance and Growth in Children: Influence of Sex, Age, and Intelligence", *Journal of Applied Physiology*, 8:4:371-380, January, 1956.

5. Ayres, A. Jean, "Patterns of Perceptual-Motor Dysfunction in Children: A Factor Analytic Study", *Perceptual and Motor Skills*, 20:335-368, 1965.

6. Ayres, A. Jean, "Interrelations Among Perceptual-Motor Abilities in a group of Normal Children", *American Journal of Occupational Therapy*, 20:6:288-292, 1966.

7. Baldwin, Willie K., "The Educable Mentally Retarded Child in the Regular Grades", *Exceptional Children*, 25:106-108, 112, 1958.

8. Bateman, Barbara, "Learning Disabilities--Yesterday, Today, and Tomorrow", *Exceptional Children*, 31:4:167-177, December, 1964.

9. Bender, Lauretta, *Psychopathology of Children with Brain Disorders*, Springfield: Charles C. Thomas Company, 1956.

10. Benoit, E. Paul, "The Play Problems of Retarded Children", *American Journal of Mental Deficiency*, 60:41-55, 1955.

11. Benoit, E. Paul, "Activity Programs for the Mentally Retarded: Extending the Mind Through the Body", *Journal of Health, Physical Education, and Recreation*, 28-30, April, 1966.

12. Benson, Kenneth R., *Creative Crafts for Children*, Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1958.

13. Benton, A. L., "Psychological Evaluation and Differential Diagnosis", *Mental Retardation: A Review of Research*, (H. A. Stevens and R. Heber, Editors), Chicago: University of Chicago Press, 1964.

14. Bier, D. C., Behavioral Disturbances in the Mentally Retarded, In H. A. Stevens and R. Heber, Editors, *Mental Retardation: A Review of Research*, Chicago: University of Chicago Press, 1964.

15. Bigham, Margaret, Editor, *The Deer Park Plan for Special Services*, Deer Park, Texas: Deer Park Independent School District, 1967.

16. Bilborough, A., and Jones, P., *Physical Education in the Primary School*, London, England: University of London Press, 1963.

17. Birch, Herbert G., *Brain Damage in Children: the Biological and Social Aspects*, Baltimore: Williams and Wilkins, 1964.

18. Birch, Herbert G., The Problem of Brain Damage in Children, In Herbert G. Birch, Editor, *Brain Damage in Children: the Biological and Social Aspects*, Baltimore: Williams and Wilkins, 1964.

19. Blatt, B., "The Physical, Personality and Academic Status of Children Who Are Mentally Retarded Attending Special Classes as Compared with Children Who Are Mentally Retarded Attending Regular Classes", *American Journal of Mental Deficiency*, 810-818, March, 1958.

20. Block, William E., "Personality of the Brain Injured Child", *Exceptional Children*, 21:91-100, 108-109, December, 1954.

21. Bobroff, A., "A Survey of Social and Civic Participation of Adults Formerly in Classes for the Mentally Retarded", *American Journal of Mental Deficiency*, 127-133, July, 1956.

22. Bock, R. D., "Multivariate Analysis of Variance of Repeated Measurements", *Problems in Measuring Change* (Chester Harris, Editor, Madison, Wisconsin: The University of Wisconsin Press, 85-103, 1963.

23. Bonney, M. E., "Values ofSociometric Studies in the Classroom", *Sociometry*, 6:251-254, 1943.

24. Brace, D. K., "Motor Learning of Feeble-Minded Girls", *Research Quarterly*, 19:4:269-275, December, 1948.

25. Brace, D. K., "Motor Fitness of Mentally Retarded Boys Relative to National Age Norms", Unpublished paper read at Research Section A.A.H.P.E.R. Convention, Atlantic City, New Jersey, March 18, 1961.

26. Brace, David K., "Physical Education and Recreation for Mentally Retarded Pupils in Public Schools", Unpublished findings of a nationwide survey supported by a grant from the Joseph P. Kennedy Jr. Foundation, 1966.

27. Broadhead, Geoffrey D., Physical Education for Children in Special Education, University of Wisconsin, Monograph, 1968.

28. Bronfenbrenner, U., "A Constant Frame of Reference for Sociometric Research, Part II", *Sociometry*, 7:40-75, 1944.

29. Budoff, M., and Pursglove, Eleanor M., "Peabody Picture Vocabulary Test Performance of Institutionalized Mentally Retarded Adolescents", *American Journal of Mental Deficiency*, 67:756-760, 1963.

30. Burt, Cyril, *The Backward Child*, 5th Edition, London, England: The University of London Press, 1961.

31. Cameron, W. McD., and Pleasance, Peggy, *Education in Movement--School Gymnastics*, Oxford, England: Basil Blackwell, 1963.

32. Campbell, Donald T., and Stanley, Julian C., *Experimental and Quasi-Experimental Designs for Research*, Chicago, Illinois: Rand McNally, 1966.

33. Cattell, Raymond B., *Personality and Motivation Structure and Measurement*, New York: World Book Company, 1957.

34. Cattell, Raymond B., and Eber, Herbert W., *Manual for the Sixteen Personality Factor Questionnaire*, Champaign, Illinois: Institute for Personality and Ability Testing, 1962.

35. Cattell, Raymond B., and Eber, Herbert W., *Handbook for the Sixteen Personality Factor Questionnaire*, Champaign, Illinois: Institute for Personality and Ability Testing, 1964.

36. Cattell, Raymond B., *The Scientific Analysis of Personality*, Baltimore: Penguin Books, 1965.

37. Clements, Sam D., *Minimal Brain Dysfunction in Children*, U.S. Department of Health, Education, and Welfare, NINDB Monograph N-3, 1966.

38. Coan, Richard W., and Cattell, Raymond B., *Guidebook for the Early School Personality Questionnaire*, Champaign, Illinois: Institute for Personality and Ability Testing, 1966.

39. Cook, D., "The Hawthorne Effect in Educational Research", *Phi Delta Kappa*, 44:116-122, 1962.

40. Corder, W. O., "Effects of Physical Education on the Intellectual, Physical, and Social Development of Educable Mentally Retarded Boys", *Exceptional Children*, 32:357-364, 1966.

41. Cowell, Charles C., "A Suggested Index of Special Adjustment in the High School", *Educational Research Bulletin*, 17:10-19, 1938.

42. Cowell, Charles C., "Validating an Index of Social Adjustment for High School Use", *Research Quarterly*, 29:1:7-18, March, 1958.

43. Cruickshank, William M., et al, *A Teaching Method for Brain-Injured and Hyperactive Children: A Demonstration-Pilot Study*, Syracuse, N.Y.: Syracuse University Press, 1961.

44. Delacato, Carl H., The Diagnosis and Treatment of Speech and Reading Problems, Springfield, Illinois: Charles C. Thomas Company, 1963.

45. Delacato, Carl H., Neurological Organization and Reading, Springfield, Illinois: Charles C. Thomas Company, 1966.

46. Denny, M. R., "Research in Learning and Performance", Mental Retardation: A Review of Research, (H. A. Stevens and R. Heber - Editors), Chicago: University of Chicago Press, 1964.

47. Dunn, L. M., and Harley, R. K., "Comparability of Peabody, Ammons, Van Alystyne, and Columbia Test Scores with Cerebral Palsied Children", Exceptional Children, 26:70-74, 1959.

48. Dunn, L. M., and Brooks, Sadye, "Peabody Picture Vocabulary Test Performance of Educable Mentally Retarded", Training School Bulletin, 57:35-40, 1960.

49. Dunn, L. M., and Hottel, J. R., "Peabody Picture Vocabulary Test Performance of Trainable Mentally Retarded Children", American Journal of Mental Deficiency, 65:448-452, 1961.

50. Dunn, L. M., Editor, Exceptional Children in the Schools, New York: Holt, Rinehart and Winston, 1963.

51. Dunn, L. M., Peabody Picture Vocabulary Test: Expanded Manual, Minneapolis, Minnesota: American Guidance Service, 1965.

52. Edmundson, J., P. E. Teachers' Handbook for Primary Schools, London, England: Evans Brothers, 1956.

53. Ellis, Norman R., Editor, Handbook of Mental Deficiency, New York: McGraw-Hill, 1963.

54. Espenschade, Anna S., "Motor Performance in Adolescents, Including the Study of Relationships with Measures of Physical Growth and Maturity", Monograph of the Society for Research in Child Development, 5:1, 1940.

55. Espenschade, Anna S., "The Contributions of Physical Activity to Growth", Research Quarterly, 31:2: Part II:351-364, May, 1960.

56. Fisher, R. A., and Yates, Frank, Statistical Tables for Biological, Agricultural, and Medical Research, Sixth Edition, New York: Hafner Publishing Company, 1963.

57. Fleishman, Edwin A., The Structure and Measurement of Physical Fitness, Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1965.

58. Fouracre, Maurice H., "Learning Characteristics of Brain-Injured Children", Exceptional Children, 24:5:210-212, 223, January, 1958.

59. Francis, R. J., and Rarick, G. L., *Motor Characteristics of the Mentally Retarded*, Washington, D.C.: *U. S. Department of Health, Education, and Welfare*, Cooperative Research Monograph No. 1, 1960.

60. Frye, Tommye D., *Recommendations for Understanding and Educating the Brain-Injured*, Pasadena, Texas: Pasadena Independent School District, Mimeographed, 1961.

61. Frye, Tommye D., Editor, *A District Plan for Special Education Provisions*, Pasadena, Texas: Pasadena Independent School District, 1967.

62. Gallagher, James J., *The Tutoring of Brain-Injured Mentally Retarded Children*, Springfield, Illinois: Charles C. Thomas Company, 1960.

63. Gardner, William I., "Social and Emotional Adjustment of Mildly Retarded Children and Adolescents: A Critical Review", *Exceptional Children*, 33:2:97-105, October, 1966.

64. Green, Arthur S., *Arts and Crafts for Primary Grade Children*, Minneapolis, Minnesota: T. S. Denison, 1962.

65. Gronlund, Norman E., *Sociometry in the Classroom*, New York: Harper and Bros., 1959.

66. Hackett, Layne C., and Jenson, Robert G., *A Guide to Movement Exploration*, Palo Alto, California: Peek Publications, 1967.

67. Hantzig, Esther, *Let's Make Presents*, New York: Thomas Y. Crowell, 1962.

68. Hayden, Frank J., *Physical Fitness for the Mentally Retarded*, Toronto: Toronto Association for Retarded Children, (186 Beverly) 1964.

69. Hays, W., *Statistics for Psychologists*, New York: Holt, Rinehart and Winston, 1963.

70. Heber, Rick, Editor, "A Manual on Terminology and Classification in Mental Retardation", *American Journal of Mental Deficiency*, Monograph Supplement, 64:2, September, 1959.

71. Highlights for Children, *Teachers' Holiday Handbook No. 3*, Columbus, Ohio: Highlights for Children, Inc., 1953.

72. Howe, C., "A Comparison of Motor Skills of Mentally Retarded and Normal Children", *Exceptional Children*, 25:352-354, 1959.

73. Hunsicker, P. A., and Reiff, G. G., *A Survey and Comparison of Youth Fitness, 1958-65*, U. S. Department of Health, Education, and Welfare, Cooperative Research Project No. 2418, University of Michigan, 1965.

74. Johnson, G. B., "A Study of the Relationship that Exists Between Physical Skills as Measured, and the General Intelligence of College Students", Research Quarterly, 13:57-59, 1942.

75. Johnson, G. Orville, "A Study of the Social Postion of Mentally Handicapped Children in Regular Grades", American Journal of Mental Deficiency, 55:60-89, July, 1950.

76. Johnson, Lillian, Papier Maché, New York: Van Rees Press, 1958.

77. Jones, H. E., Motor Performance and Growth, Berkeley: The University of California Press, 1949.

78. Jordan, June B., Intelligence as a Factor in Social Position--a Sociometric Study in Special Classes of the Mentally Handicapped, Unpublished Doctoral Dissertation, University of Illinois, 1960.

79. Jordan, Nina R., Holiday Handicraft, New York: Harcourt, Brace and Corporation, 1938.

80. Kephart, N. C., The Slow Learner in the Classroom, Columbus, Ohio: Charles E. Merrill, 1960.

81. Kephart, N. C., "Perceptual-Motor Aspects of Learning Disabilities", Exceptional Children, 31:4:201-206, December, 1964.

82. Kirchner, G., Physical Education for Elementary School Children, Dubuque, Iowa: Wm.C. Brown Company, 1966.

83. Koppitz, E. M., "Diagnosing Brain Damage in Young Children with the Bender Gestalt Test", Journal of Consulting Psychology, 26:541-547, 1962.

84. Koppitz, E. M., The Bender Gestalt Test for Young Children, New York: Grune and Stratton, 1966.

85. Laing, Alice F., and Chazan, Maurice, "Sociometric Grouping Among Educationably Subnormal Children", American Journal of Mental Deficiency, 71:1:73-77, 1966.

86. Lee, Carvel, Art Guide, Minneapolis, Minnesota: T. S. Denison, 1959.

87. Lee, Tina, What to do Now, Garden City, N.Y.: Doubleday, 1946.

88. Leeming, Joseph, Holiday Craft and Fun, Philadelphia, Pennsylvania: J. B. Lippincott, 1950.

89. Leeming, Joseph, How to Make and Have Fun with Greeting Cards, Philadelphia, Pennsylvania: J. B. Lippincott, 1960.

90. Leeming, Joseph, Fun with Boxes, Chicago: Spencer Press, Inc., 1960.

91. Linse, Barbara B., Well Seasoned Holiday Art, Palo Alto, California: Fearon Publishers, 1956.

92. London County Council, Educational Gymnastics, London, England: London County Council, 1962.

93. Lowe, Benjamin J., The Effects of Physical Conditioning on the Cognitive Functioning of Educationally Sub-Normal Boys, Birmingham University, England: Department of Psychology, 1966.

94. Malpass, L. F., "Motor Skills in Mental Deficiency", Handbook of Mental Deficiency (N. R. Ellis, Editor), New York: McGraw-Hill, 1963.

95. Maslund, R. L., Mental Subnormality, New York: Basic Book Company, 1958.

96. McKenty, Stuart B., Editor, A District Plan for Special Services, Galena Park, Texas: Galena Park Independent School District, 1967.

97. McNeice, William C., and Benson, K. R., Through Their Hands They Shall Learn--Crafts for Retarded, Bloomington, Illinois: McKnight and McKnight, 1964.

98. Miller, R. V., "Social Status and Socioemphatic Differences Among Mentally Superior, Mentally Typical, and Mentally Retarded Children", Exceptional Children, 23:114-119, 1956.

99. Moreno, J. L., Who Shall Survive?, Third Edition, New York: Beacon House, 1955.

100. Moreno, J. L., Editor, Sociometry and the Science of Man, New York: Beacon House, 1956.

101. Morrison, Ruth, Educational Gymnastics, Liverpool, England: Speirs and Gledsdale, 1956.

102. Morrison, Ruth, Educational Gymnastics for Secondary Schools, Liverpool, England; Speirs and Gledsdale, 1960.

103. New Zealand Government, Physical Education Branch, Physical Education in Junior Classes, Wellington, N.Z.: R. E. Owen, Government Printer, 1967.

104. Northway, Mary L., A Primer of Sociometry, Toronto, Canada: University of Toronto Press, 1952.

105. Northway, Mary L., and Weld, Lindsay, Sociometric Testing: A Guide for Teachers, Toronto, Canada: University of Toronto Press, 1957.

106. Nunley, Rachel L., "A Physical Fitness Program for the Mentally Retarded in the Public Schools", Physical Therapy, 946-954, October, 1965.

107. Oliver, J. N., "The Effect of Physical Conditioning Exercises and Activities on the Mental Characteristics of Educationally Sub-Normal Boys", British Journal of Educational Psychology, 28:155-165, 1958.

108. Oliver, J. N., "The Effects of Physical Condition on the Sociometric Status of Educationally Sub-Normal Boys", Physical Education, 156: 38-46, 1960.

109. Oliver, J. N., Personal Conversation, University of Birmingham, England, May 8, 1968.

110. Oliver, Rita N., Rain or Shine: Things to Make, New York: Harcourt and Brace, 1954.

111. Olree, H., Stevens, C., Nelson, T., Agnevik, G., and Clark, R., "Evaluation of the A.A.H.P.E.R. Youth Fitness Test", Journal of Sports Medicine and Physical Fitness, 5:67-71, 1965.

112. Porter, Rutherford B., and Cattell, Raymond B., Handbook for the IPAT Children's Personality Questionnaire: "The CPQ", Champaign, Illinois: Institute for Personality and Ability Testing, 1959.

113. Porter, Rutherford B., and Cattell, Raymond B., Interim Manual for the Children's Personality Questionnaire, Champaign, Illinois: Institute for Personality and Ability Testing, 1963.

114. Porter, Rutherford B., Collins, James L., McIver, M. Raymond, "A Comparative Investigation of the Personality of Educable Mentally Retarded Children and Those of a Norm Group of Children", Exceptional Children, 31:9:457-463, May, 1965.

115. Press, John, McCall's Giant Golden Make It Book, New York: Golden Press, 1956.

116. Rabin, H. M., "The Relationship of Age, Intelligence and Sex to Motor Proficiency in Mental Defectives", American Journal of Mental Deficiency, 62:3:507-516, 1957.

117. Rarick, G. Lawrence, "Research in Physical Education as it Pertains to the Mentally Retarded Child", Unpublished paper, Department of Physical Education, University of Wisconsin, 1965.

118. Rarick, G. Lawrence, "How the Retarded Child Learns Through Physical Activity", University of Wisconsin, Madison: Monograph, 1965.

119. Rarick, G. Lawrence, "The Factor Structure of Motor Abilities of Educable Mentally Retarded Children", Paper presented at the Joseph P. Kennedy, Jr. Foundation Third International Scientific Symposium of Mental Retardation, Boston, April 11, 1966.

120. Rarick, G. Lawrence, Widdop, James H., and Broadhead, Geoffrey D., The Motor Performance and Physical Fitness of Educable Mentally Retarded Children, Madison, Wisconsin: University of Wisconsin, Department of Physical Education, 1967.

121. Rarick, G. Lawrence, Widdop, James H., and Broadhead, Geoffrey D., Environmental Factors Associated with the Motor Performance and Physical Fitness of Educable Mentally Retarded Children, Madison, Wisconsin: Department of Physical Education, University of Wisconsin, 1967.

122. Ray, H. C., "Interrelationships of Physical and Mental Abilities and Achievement of High School Boys", Research Quarterly, 11:129-141, March, 1940.

123. Robbins, Melvyn P., "A Study of the Validity of Delacato's Theory of Neurological Organization", Exceptional Children, 32:517-523, 1966.

124. Robbins, Melvyn P., "Test of the Doman-Delacato Rationale With Retarded Readers", Journal of the American Medical Association, 202:5:87-91, October 30, 1967.

125. Roethlisberger, F. J., and Dickson, W. J., The Management and the Worker, Cambridge, Massachusetts: Harvard University Press, 1939.

126. Ross, Roberta, Easy-to-Makes, The Instructor Handbook Series, Dansville, N.Y.: F. Owen Publishing Company, 1966.

127. Schloat, G. Warren, Playtime for You, New York: Charles Scribner, 1950.

128. Sengstock, Wayne L., "Physical Fitness of Mentally Retarded Boys", Research Quarterly, 37:1:113-120, 1966.

129. Sloan, W., "Motor Proficiency and Intelligence", American Journal of Mental Deficiency, 55:394-406, 1951.

130. Solomon, A. H., and Pangle, R., "The Effects of a Structured Physical Education Program on Physical, Intellectual, and Self-Concept Development of Educable Retarded Boys", Behavioral Science Monograph No. 4, Nashville, Tennessee: George Peabody College, 1966.

131. Solomon, A. H., and Pangle, R., "Demonstrating Physical Fitness Improvement in the EMR", Exceptional Children, 34:3:177-181, 1967.

132. Stein, Julian U., "Motor Function and Physical Fitness of the Mentally Retarded", Rehabilitation Literature, 230-242, 1963.

133. Stein, Julian U., "The Reliability of the Youth Fitness Test", Research Quarterly, 35:3:328-329, 1964.

134. Stein, Julian U., "Physical Fitness of Mentally Retarded Boys Relative to National Age Norms", Rehabilitation Literature, 205-208, July, 1965,

135. Stein, Julian U., and Pangle, Roy, "What Research Says About Psychomotor Function of the Retarded", JOHPER, 37:4:36-38, 1966.

136. Stevens, Harvey A., and Heber, Rick, Mental Retardation: A Review of Research, Chicago, Illinois: University of Chicago Press, 1964.

137. Strauss, A. A., and Lehtinen, L., Psychopathology and Education of the Brain-Injured Child, New York: Grune and Stratton, 1947.

138. Strauss, A. A., and Kephart, N. C., Psychopathology and Education of the Brain-Injured Child: Vol. II, Progress in Clinic and Theory, New York: Grune and Stratton, 1955.

139. Strother, Charles R., Discovering, Evaluating, Programming for the Neurologically Handicapped Child, with Special Attention to the Child with Minimal Brain Damage, Chicago, Illinois: National Society for Crippled Children and Adults, 1963.

140. Texas Education Agency, State Plan for Special Education, Austin Texas: Texas Education Agency, 1965.

141. Vannier, M., and Foster, B. S., Teaching Physical Education in Elementary Schools, Second Edition, Philadelphia: W. B. Saunders, 1958.

142. Ventre, A. G. L., "The Place of Sociometry in Physical Education and an Investigation Into the Specificity of Choice Criterion", Research Papers in Physical Education, 2:41-46, April, 1966.

143. White, G. B., " Sociometric Investigation of the Effects of Three Different Types of Indoor Lessons in Physical Education", Research Papers in Physical Education, 2:47-53, April, 1966.

144. Widdop, James H., The Motor Performance of Educable Mentally Retarded Children with Particular Reference to the Identification of Factors Associated with Individual Differences in Performance, Unpublished Doctoral Dissertation, Madison, Wisconsin, Department of Physical Education, The University of Wisconsin, 1967.

145. Winer, B. J., Statistical Principles in Experimental Design, New York: McGraw-Hill, 1962.

146. Wisconsin State Department of Public Instruction, *Aids to Motoric and Perceptual Training*, Bulletin No. 4a. Bureau of *Handicapped Children*, Madison, Wisconsin, 1964.

147. Wisconsin State Department of Public Instruction, *A Movigenic Curriculum*, Bulletin No. 25, Bureau for Handicappted Children, Madison, Wisconsin, 1965.

148. Zigler, Edward, "Familial Mental Retardation: A Continuing Dilemma", *Science*, 155:3760:292-298, January, 1967.

APPENDICES

APPENDIX A

INDIVIDUALIZED PHYSICAL EDUCATION PROGRAM
Examples of Work Completed

THE INDIVIDUALIZED PHYSICAL EDUCATION PROGRAM

Several types of work were outlined in Chapter Three; the work essentially followed that outlined in several excellent texts (16, 31, 92). The material, however, was, and had to be, manipulated greatly to cater for the children in the experimental program.

Two examples, described very briefly, have been included of the type of work accomplished by the children. The way in which the material and method was handled by the teachers was seen as being of paramount importance, and hence the words do not adequately convey the conceptual base which the teachers were able to form and develop during the program.

JUMPING AND LANDING

The importance of jumping and landing is stressed in regard to the skills themselves, and the inclusion of the skills into sequence work. It has been said that "we jump for joy!" -- mentally, jumping activities are exhilarating; from a physical point of view they are stimulating and worthwhile. The correct techniques of jumping and landing should be given immediate attention with careful teaching. A great deal of practice is needed by the children.

Types of Jumping:

1. With or without apparatus.
2. On the move or on the spot.
3. Onto, over, from, or around apparatus.
4. Off one foot, off the other foot, off both feet.

Whatever type of jumping practice, the activity itself can be changed by the varied use of the arms, the legs, by the direction and shape of the body, and by the speed of the movement.

Jumping Practices:

Since it is important that the children are physically active for the largest portion of the lesson, jumping and landing tends to be combined with walking or running activities. In this way the practice in jumping will be continuous rather than single ones.

a. Using no apparatus

Let the children practice, freely, any type of jump -- emphasize a special quality, for example, height, stretch, lightness. The "bouncing ball" type of jumping is helpful; stress differences in the place of the movement (vertical or horizontal or a combination of the two), or the direction of the movement (forwards, backwards, sideways). Turning the body in the air shows change in direction. Attempt different shpaes that the body can adopt in the air.

b. Using apparatus

As for the above section, using various kinds of apparatus to jump with, over, or around.

It is possible to use blocks, balls, ropes, canes, hoops, or mats, and the ideas for patterns, as outlined above, where jumping practices without apparatus are suggested, can be applied here.

A variety of jumping activities can occur through the children observing each other's movements, from an idea or a theme introduced by the teacher, or by using the small apparatus, for example:

1. Jumping with a rope, a ball, a bean bag or a hoop, etc.
2. Jumping around a block, or over some apparatus.
3. Jumping with a rope, etc. -- on the ground.
4. Jumping along a rope, in and out of a hoop, etc.

Landing:

"What goes up, must come down!" The ability of the children to control the body after a jump is of obvious importance. It is important that the children should quickly learn efficient ways of landing so that when they are jumping, for example, from a height, they are able to land safely, with control, and without the fear of hurting themselves (16). From an observation of children at play it will be noted that when landing from a height, they bend their knees fully during the impact, and if this is not sufficient to absorb the jar of contact with the ground, they roll or fall over.

The method of landing suggested as a teaching routine by Bilborough and Jones is:

1. A deep bending of the knees where the weight of the body is taken on the ball of the feet.
2. The "tail" sits on the heels.
3. The knees are forward and the body and head are erect with the arms loose and relaxed at the sides.
4. The impact is followed immediately by the quick rebound and a little jump to a standing position (like a "jack in the box") (16).

Practice in Jumping and Landing:

1. Using no apparatus stress an aspect of technique to be practiced, for example, height.

   Jump off one foot.
   Jump off the other foot.
   Jump off both feet.
   Jump while running.

Jump from one foot to the same foot.
Jump from one foot to the other foot.
Jump from one foot to both feet.
Jump from both feet to one foot.
Add another movement, using a leg or arm.
Jump in different directions.
See how the direction can change.

2. Using apparatus

Jumping over a block, mat, rope.
Jumping onto or around apparatus.

Much of this work is particularly appropriate to a very informal teaching approach. The children can be afforded the opportunities to practice and experiment freely, at their own level of ability, but still within a general frame of reference used by the teacher. Small apparatus usually proves a great motivating force to children, and with jumping and landing practices has been found to add much to developing this aspect of the work. Different kinds of jumping experience are elicited from different pieces of apparatus. The importance of child demonstration is stressed in relation to its value in maintaining child motivation high, and in developing variety and quality in movement.

This is a portion of the work completed on jumping and landing. For further reference the reader should examine the work of Bilborough and Jones (16), Cameron and Pleasance (31), Hackett and Jenson (66), and the booklet published by the London County Council in England (92).

USING SMALL APPARATUS

Small apparatus can be used at any time during the lesson, and can be used in many ways. For example, in jumping and landing activities apparatus can provide the children with the opportunities to widen their own movement experience, and thus increase their repertoire of accomplishments. Additionally, apparatus can be used in activities where the apparatus itself is the focus . . . "the ways of bouncing the ball using both hands".

This apparatus is used to increase the level of skill attainment in particular specified activities (bouncing, throwing), to provide opportunities for child exploration in developing activity of a particular type, and also in providing a "completely" free choice of activity where the age, inclination, and ability of the children will decide the tasks performed.

REMEMBER — in this program — the child should be working BY HIMSELF — and NOT with a partner, a group, or a team.

As in other types of the work, use must be made of effective demonstration (by the children), and by the observation of the class. Children should be "looking for" and not merely "looking at".

Ball Activities:

Ball handling activities are most useful because skill in handling a ball is essential to many games. It has been found that balls are a great motivating force to children, and it is possible, therefore, to include ball activities in many lessons.

The ball can be moved:

Any way.
Throwing and catching.
Bouncing.
Using the hands, or just one hand.
Using the feet.
Using other parts of the body.
Using several parts of the body in combination.

It can be moved:

In the air.
On the ground.
While stationary.
On the move.
On the ground using the hands and/or feet and/or other parts of the body.
Against an object (the wall).
At an object (target).
With an object (a bat).
Etc.

Always encourage the children to:

Practice something different.
Improve the quality of some activities.
Find many ways of using the apparatus.
Join movements together.

A few examples of bouncing activities are:

Freely.
Using one hand
Using the other hand.
Using alternating hands.
Using both hands at the same time.
Using the palm and/or the back of the hand.
Using the feet.

With the body in different positions:

A prone postion.
A supine postion
Kneeling.

Standing.
Sitting.
Balancing.
Moving.

at different speeds while on the same spot or while moving.

at different heights and frequencies.

at different directions.

making patterns or shapes.

APPENDIX B

GROUP-ORIENTED PHYSICAL EDUCATION PROGRAM
Examples of Work Completed

THE GROUP-ORIENTED PHYSICAL EDUCATION PROGRAM

The work in this experimental treatment was of three types, which were:

Relay activities, involving teams.
Partner activites, involving pairs.
Class activities, involving larger groups or the whole class.

From each section several examples of the work undertaken by the children are included. These activities and hundreds of others appear in many physical education texts. It should be remembered that the research design included two age groups, two sexes, and two disabilities, and hence individual activities frequently were adapted to suit particular classes. Hence the role of the teacher rather than the actual game or relay was stressed.

Relay Activities

Introduction

Many books include descriptions of relay races; the purpose of this section is not so much to list races but to indicate how material can be manipulated to produce many different activities, and how material can be developed to produce progressively more complex activities.

Thus the basic idea inherent in Relay No. 1 has been MANIPULATED in that the idea has been used to produce several activities. In addition, activities develop in their own complexity.

It will be noted that no mention is made of the number of children taking part in each activity. This will depend upon:

1. The stage of development of this type of work.
2. The actual activity.
3. The numbers in the class.

Relay No. 1, for example, could be taught using two groups of eight in each group, or three groups of five or five groups of three. Each way of organizing the relay is more complex than the previous one, and involves the child to a greater extent. If a child is a member of a group of eight children, he is active for 1/8 of the time; in a group of three, 1/3 of the time. Therefore, each child is active more if the numbers in the teams are at a minimu. On the other hand, the larger the group, the more the children have time to see and understand the activity and realize what their part in it is. Thus, it is suggested that the class be organized in larger groups before progressions be made to small groups.

The question can be asked, "How do I divide the class if I have unequal numbers?" If there are thirteen children in a class there could be two groups (one of six and one of seven), or three groups (two of four, one of five), etc. Such numbers can be manipulated in the following manner:

Imagine Relay No. 1 — with two teams (one of six, one of seven):

```
                                   X
                  X                X
                  X                X
                  X                X
        Team A    X      Team B    X
                  X                X
                  X     Start      X
             _________________________
```

On the command "Go!" the race proceeds as normal; team B each has one turn and then the whole team squats. Team A all has one turn and then the first child in the team has a second turn and then all the team squats. Thus, for each team seven turns have occurred, each child having had one turn except for one child in Team A.

This type of organization can occur with any number of children, but it is important to remember to see that the children change positions frequently, so that:

1. The same child is not always the leader.
2. The same child is not always at the end of the line.
3. The same child does not always receive the extra turn.

Two further ways to use the same activity are:

1. Have the last child race first — on up through the line until the front child receives his turn, and/or
2. Have every child face the opposite direction, and run the relay again, so that the last child becomes the first, and vice versa.

In each instance the relay is the same but the orientation of the child is adjusted. Such changes <u>may</u> not be made easily by these children.

Straight Relays

1. First child in each team runs, round the marker, and back, tags outstretched hand ofnext child, and goes to end of the team. The next child must wait behind the starting line until his hand is tagged. When every child in the team has had a turn, the whole team squats. First team in a straight line wins.
2. As No. 1, but children to skip.
3. As No. 1, but children to hop on any foot.
4. As No. 1, but children to hop on left foot.
5. As No. 1, but children to hop on right foot.
6. As no. 1, but children to hop on one foot <u>to</u> the marker, and hop on the <u>other</u> foot on the return.
7. As No. 1, but children to crawl (move on hands and legs).
8. As No. 1, but children run there, and hop/skip/crawl back.

9. ANY COMBINATION of the above.

10. Change the marker to a hoop, children must run around or crawl through, etc.

11. Child to use a ball — bouncing it to and round the marker, etc. — or rolling.

12. Ball bouncing with left hand, right hand, either hand, both hands together.

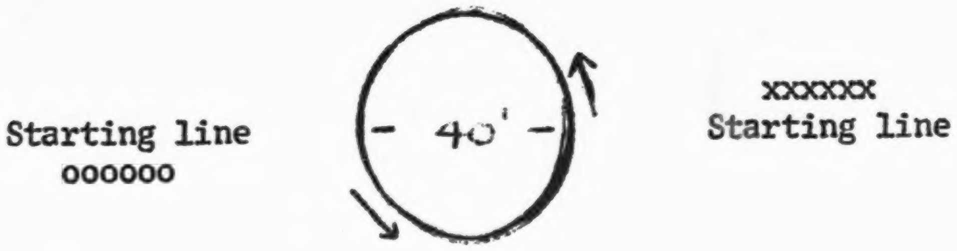
13. Same as before, but use a larger ball.

14. Use a mat to run round
jump over
roll along — any way
forwards
backwards
once forward/
once backward.

15. ANY COMBINATION, e.g., Hop on the left foot to the mat, roll along the mat, run round the marker and back to the next child, etc.

Circle relays

1. Two teams line up at opposite sides of a circle (square, or any marked area) 40 feet in diameter.



On the starting signal, the first player runs to his right around the circle (or marked area) and touches the second player on his team who in turn runs around the circle. The running continues until all members of a team have run. The team finishing the first without a foul (sit/stand/ stand on one leg/ place hands on head or toes, etc.) wins the relay.

2. As No. 1, but hopping on one leg.

3. As No. 1, but skipping.

4. As No. 1, but crawling.

5. As No. 1, but carry and pass an object (ball, etc.).

6. As No. 1, but use a variety and combination of situations.

Go Touch Relays

1. Divide the class into teams. Teacher gives the commands. All the team responds. The first team responds. The first team back in line (standing, sitting, etc.) wins. The command can be given, "Touch the tree."

2. As No. 1, "Touch my hand."

3. As No. 1, "Touch the grass."

4. As No. 1, "Touch the right foot of every other member of your team," etc.

5. As No. 1, "Hop on one foot."
6. As No. 1, "Crawl."
7. As No. 1, "Run."
8. As No. 1, "Run backwards," etc.

Zig Zag Relays

Divide the class into teams. On the command the LAST child in each team begins to zig zag in and out of the others in his team. He then runs and touches a distant object. Then he runs and touches a second object behind his team. He then returns to his own position in the team.

Basically this type of relay can be varied in two ways:

1. By varying the type of movement to be undertaken by the runner. For example he can run in and out (zig zag) or skip, hop, crawl; or he could jump over, crawl through, etc., or any combination of these movements.
2. By varying the type of object to be touched. The object could be run round, touched, crawled through, jumped over, etc.

Follow-On Relays

These relays are difficult but are exciting to play and watch. They should be introduced only after the children are familiar with many different types of relays. The difference between this type of relay and the straight or zig-zag relays is that the children "follow-on". This means that instead of a child completing his turn before the next child moves, the second child follows the first child. Thus, the children run, hop, skip, etc. — in line to touch the object, and return to their own places in line.

N.B. Straight relays and zig zag relays can both be developed into follow-on relays.

Paul Revere Relay

This is a shuttle relay. After each team selects a rider the players number off, the even numbers standing on one side and the odd numbers on the opposite side. On a signal the rider mounts the back of Number 1 who carries him to Number 2 where the rider, without touching the ground, exchanges mounts and Number 2 carries him to Number 3. Continue until the last man carries the rider across the finishing line. If a rider falls off he must mount again at the point of the fall.

Posture Relay

Each team stands behind a line. The first child in each team places a block of wood or a chalk eraser on his head and attempts to walk to the opposite line and back without touching or dropping the eraser. If he drops it, or touches it, he must return to the line he just left (starting line or turning line), place it back on his head, and continue.

Each child takes a turn, and the first team to finish wins.

Since this is a slow race keep the teams short so that each child does not have to wait too long for a turn. For the younger groups, have the child continue after replacing a block on his head rather than return to the line.

Spoke Relay

Each team forms a circle and all sit with their legs stretched outwards in front of them. On a signal a player stands and hurdles (clockwise or anticlockwise) each player in his team before touching off the next player.

Rescue Relay

Each team lines up behind the starting line, with the leader facing the team but behind a line 30-50 feet away. The leader runs to the first player on his team, grasps the player's right (left or both) hand, and both run back to the goal line. The rescued palyer runs back and gets the next player until all have been rescued.

Heads and Tails

The class is divided into teams. When the teacher calls "heads," leaders stand still while all the team race around him and return to their places without touching anyone. On "tails," the last person stands still and all the teams race around him and back to their places.

Around Ball

Children form two equal circles, each having a captain and a ball. At a signal, each captain passes the ball quickly to the person on his right (left) and so on until it comes back to the captain, who calls "one" and without stopping passes the ball on again. This is repeated until the captain calls out "five" at which he raises the ball high over his head as a signal that his team is through passing. The side that finishes first wins.

Roll the Ball Relay

Draw up a starting and a turning line, some 40-50 feet apart. The teams line up behind the starting line; the leader holds the ball. On the signal, the leader runs to the opposite line and rolls the ball back to the next person in line. This action is repeated by every player except the last, who runs across the line and holds the ball up in the air to indicate that his team has finished.

Over and Under Relay

Players are in relay formation. The first player in each line has a ball. At a signal the first player passes the ball over his head to the second player who passes it between his legs to the third. The ball is passed over and then under the entire length of the file. The last player, upon receiving the ball, runs forward to the front of his file and starts the ball going again. This is continued until the file is back in its original line-up and the ball is in the hands of the original first player. The file finishing first wins.

Partner Activities

1. Siamese Twins

Two players sit back to back with arms folded and legs extended ahead and together. The object of the game is to see who can get to his feet the fastest without unfolding the arms throughout the whole attempt. This can be varied by having the legs crossed while sitting and have both partners try to stand up together (by pressing against each other's back).

2. Shadow Tag (when the sun is out)

Two players stand facing each other in such a way as to have their shoulders to one side. The object of the activity is to see how often a player can step on his partner's shadow without having his own shadow stepped on.

3. Knee Tag

Two opponents stand facing each other about five feet apart. Upon a signal each attempts by sparring, sidestepping, and dodging to tag his opponent's knee while at the same time protecting his own. Use one hand, the other or either hands to touch one, the other or both knees.

4. Arms Length Tag

Two players stand each with an arm extended at full length at shoulder level. Each tries to touch the other above the waist without being touched in return. A touch on the extended hand does not count. Count the number of "touches" to see who gains the most during a limited time.

5. Chinese Boxing

Partners stand facing each other with arms raised half-way upwards. With his own right hand each player grasps the other's left wrist. With the hand free to move about, i.e., the left hand, each tries to tap the other gently on the cheek (top of the head) without having one's own cheek tapped in turn. Change grips and repeat).

6. Part Hands

a. One player starts with arms bent at chest level with the fingers touching at chest height. His partner grasps him by the wrist. The first player tries to raise his arms (finger-tips touching) to be placed on top of his head. The partner attempts to prevent this.

b. A variation could be to start with the hands on the top of the head, and the partner attempts to bring the arms down to chest level.

c. A second variation would be that from the starting position the second player tries to force the finger tips of his partner apart. The first palyer tries to keep them together. This activity could also be done in reverse.

7. Chinese Get-Up

Partners stand back to back with elbows locked. Sink to floor and rise by taking small walking steps and pressing against backs.

8. In and Out

Partners face each other.. One stands with feet astride and his partner goes through the legs on all fours and then returns to his own position. Go through legs forwards or backwards. Variations of this activity can be made by having a partner run round and/or jump over (leap frog) the other child before returning to his position.

9. Wash the Dishes

Partners face each other with hands shoulder height, stretched sideways. Trunk bend side to side. Lift up one pair of arms and turn under, to end back to back. "Wash the dishes, dry the dishes, turn the dishes over."

10. Tug-of-War

Partners stand one either side of a line, holding right hands (or left, or both hands). On a signal, each player tries to pull the partner across the line and to avoid being pulled over himself. Try the same activity by linking elbows and clasping own wrist with other hand.

11. Elbow Wrestle

Both partners lying on the floor or sitting at a table facing each other. Right hands are clasped with elbows held against each other. The object is to force the other's arm down while keeping elbows together. Try the same activity using left arms.

12. Twister

Partners stand facing each other with right hands clasped. These hands remain clasped throughout the stunt. Child B leans forward and Child A, with his left leg, steps over the locked hands, finishing with his back to Child B. Child B repeats the action, stepping with his right leg over the clasped hands. Children are now back to back. Child A follows with the right leg, returning to the original position. Child B follows with the left leg. Continue several times.

13. Hoop Roll

One child rolls a hoop, the other tries to run through. One child rolls a hoop, then both run on either side holding hands over the hoop as close to the hoop as possible without touching it until it "dies".

14. Mirrowing

As the teacher names a part of the body, for example, the elbow, the children make them touch their partner's. Other examples are backs, heels, palms, soles of feet. This activity may be done lying on the ground.

15. Dodge and Mark

A good warming-up activity introducing running and the fundamentals of attack and defense. Players stand in pairs, one the "attacker" and the other the "defender". At a given signal the attackers must try to get free and the defender must follow them closely, and try to keep within touching distance, so that when the whistle blows, they can touch their opponents. The players then reverse the positions, so that both get a turn in "covering their man". This activity can be done walking, running, hopping, etc.

16. Wheelbarrows

The first partner places his hands on the floor, shoulder distance apart, knees straight, weight on the hands and feet. The other partner steps between the legs of the first partner and picks them up. He then walks his partner forward like a wheelbarrow. Both keep their back straight. At the end of the activity the carrier lowers the legs to the grouns — he does not drop them.

Class Activities

1. In Houston

The teacher says, "In Houston I saw children riding bicycles," and all the children mime riding bicycles. After a few seconds the teacher taps one child on the shoulder, and immediately claps her hands. All stop, and the child who has been touched tells what she saw, e.g., "In Houston I saw children spinning tops," or bouncing ball, dancing, chopping wood, etc.

All carry out the appropriate movements.

2. What Have You in Your Store Today?

The children walk briskly after the teacher saying, "What have you in your store today?"

Teacher replies, "airplanes" or "trains", or "spades", or "cans", etc. The children make the actions suggested. After several actions, the teacher says, "I have nothing left in my store today."

3. Brownies and Fairies
Cowboys and Indians
Cops and Robbers

Two lines are drawn 40-50 feet apart for goals. Players form two groups and stand behind the goals. One group (fairies) turn their backs, hide their eyes while the other group (brownies) creep up as quietly as possible. When the brownies get near enough the teacher says "Look Out! The Brownies are Coming." The fairies turn and try to catch as many brownies as they can before the brownies cross their own goal line. The groups take turns chasing each other to see who can catch the most in any one turn.

4. Live Wire

The children stand side by side in a circle. One child is "It" and stands in the center of the circle with a rope and swings the rope around the circle. As he swings the rope around the circle maintaining contact with the floor, the children try to jump over the circling rope. "It" will find ways that he can best swing the rope. Some will have success if they get down close to the floor, turning as they swing; others will pass the rope from one hand to the other as they kneel. The object of the game is to avoid getting hit with the rope; if one is hit, he becomes "It", and the game starts again.

See that the rope is swung touching the ground.

5. Crows and Cranes

Children are divided into two groups, the "Crows" and the (Cranes." The groups stand on a line shoulder to shoulder (or a few feet apart). The leader calls either "Crows" or "Cranes" using a "Krrrr" sound at the start of either work to mask the result.

If "Crows" is the call, the "Crows" chase to their own goal line. If a Crane catches a Crow, then the Crow has to carry the Crane back to the starting position.

Alternate words of command are "Blue" or "Black," "Rats" or"Rabbits," "Crusts" or "Crumbs."

6. Pom Pom Pullaway.

a. Two lines are drawn about 40 feet apart. All the players stand behind one of these lines. A child, who has been chosen, stands in the center of the open space and calls:

"Pom Pom Pullaway.

If you don't run, I'll pull you away."

All the players run to the opposite goal. The player in the center tags as many children as possible. Those tagged become helpers, and the game continues. The last child tagged is the winner and becomes the caller for the next time.

b. This game can be varied by having skipping (hopping, crawling, etc.) instead of running. Remember that the caller and the players must move in the same manner, (run, skip, hop, crawl).

7. Free and Caught

Two children need to be the catchers. They try to tag as many players as they can. Whenever a player is caught, he has to stand still with his arms corssed (or sit/squat/crouch, etc.). But if a "free" player comes along and touches him, he is free to run around again. The catchers try to get everyone caught and standing still, while the players try to keep everyone free.

There is a great deal of continuous running involved in this game, and the length of the game involves not only the ability of the catchers, etc. — the number of the catchers; two catchers may be insufficient to obtain a good balance between the catchers and players. The catchers should usually manage to win!

8. Letters

A leader stands at one end of the area, and the palyers stand at the other. The leader stands facing the group of players and calls out a certain letter. The players take one stride forward for every occurence of that letter in his name unless it is a capital letter, in which case he takes two strides. The leader calls any letter at random, but gives the players time to complete each turn. The winner, who is the first to reach a prearranged spot, about 25 feet from the starting line, takes the leaders' place.

This game can be varied by the players assuming fictitious names, such as the name of a flower, tree, etc.

9. Poison

A circle, hoop or small mat is used. A group of players holds hands around the object. Everyone tries to pull everyone elso into the circle or onto themat without themselves stepping in or on it.

10. Keep the Basket Full

The teacher scatters the balls. The children collect them one at a time and replace them in the container (e.g. a basket). The teacher's aim is to empty the basket.

11. Chain Tag

Two children form a pair by holding the inside hands. Then try to tag the other children with the "free" (outside) hands. When a child is caught he tags onto the others. Thus, eventually there may be a line (chain) of 10 children (holding hands so that there are still only two outside hands free to tag), trying to tag the rest of the class.

This activity can be varied by allowing the children, when tagged, to form pairs who help to catch the other children. Remember that the inside hands must be held at all times.

12. Couple Tag

Mark two goal lines 50 feet apart. The children run in pairs with the inside hands joined. All pairs except one line up on one of the goal lines. A pair is in the center and is "It." The pair in the center calls "Come," and the other pairs run to the other goal line, keeping hands joined. The pair in the center tries to tag any pair using only the joined hands. As soon as a couple is caught, it helps the center couple. The game continues until all are caught. The last couple caught is "It" for the next game.

13. Team Dodge Ball

One team makes a circle and the other stands inside it. The circle team attempts to hit the palyers in the middle of the circle with the ball. Only hits below the waist count. Play until all of the team has been hit, or play for a certain length of time (noting the number of hits), or allow only a certain number of throws (noting the number of hits).

14. Dodge Ball

Players are scattered anywhere within a designated playing area (half the size of a basketball court). To start the game, the leader tosses the ball into the air so that it will land within the field of play. Any player may attempt to secure the ball. The player who gets the ball then tries to hit another player with a fly ball. The thrower must throw the ball from the spot where he secured it, but he is permitted one step to make his throw. A player may avoid being hit by running anywhere within the area, or dodging, or by catching the ball thrown at him. When a player is hit, he is eliminated from the game until the player who hit him is in turn "hit out." Then he may return to the game.

Play continues in this manner, as each player tries to eliminate as many other players as possible without being eliminated himself.

15. Passball

The game is between two teams. The game is begun with a jump ball between two opponents. The team that gets the ball tries to complete a certain number of passes (e.g., 4, or 6, or 8). If the ball is intercpeted by the other team, the counting begins again. When one team completes the desginated consecutive number of passes a point is scored. Players may not run with the ball.

It is important to mark off the area within which play must occur.

The game may be varied by allowing the player with the ball to run with it. Remember this is a non-contact game.

APPENDIX C

THE ART PROGRAM
Examples of Work Completed

THE ART PROGRAM

It has been stated that the work in this program was in four sections:

Painting
Pasting
Paper-Cutting
Construction Work

Examples from each section have been included to indicate the type of work, described in numerous books,[1] which was successfully accomplished by the educable retarded children, and brain injured children.

A. PAINTING

1. Finger painting.
2. Painting with a brush.
3. Painting with string.
4. Resist painting using wax crayons and water color.
5. Painting action pinmen on newspaper.
6. Scratch Picture. A wax crayon design was covered with black paint. A sharp implement was used to scratch a second picture or design.
7. Blow painting.
8. Double crayon scribbling.
9. Potato printing.
10. Hand print painting.

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[1] These books appear in the Bibliography as references: 64, 67, 71, 76, 79, 86, 87, 88, 89, 90, 91, 97, 110, 115, 126.

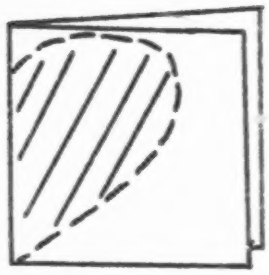
B. PASTING

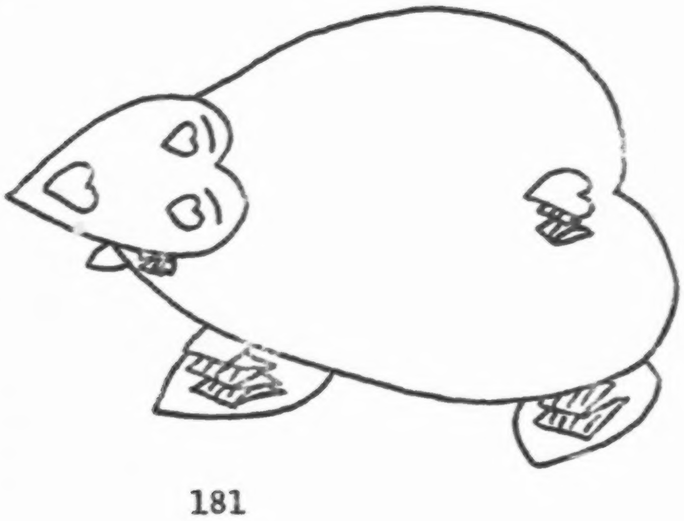
1. Mosaic pictures: small squares of different colored paper were cut, pasted, and assembled.

2. Pasta, macaroni, peas, yarn, and paper cups were pasted to form pictures and designs.

3. Heart pet: Use red and white construction paper and paste. Cut heart pattern from a 4-inch square, for body, another heart shape from a 2-inch square for the head and 4 heart shapes from 1½-inch squares for the feet. Cut 4 strips of white construction paper ½-inch by 3-inches. Fold the strip back and forth to make accordion legs. Make neck ½-inch by 4-inches and pleat the same way. Make tail only 2-inches long.

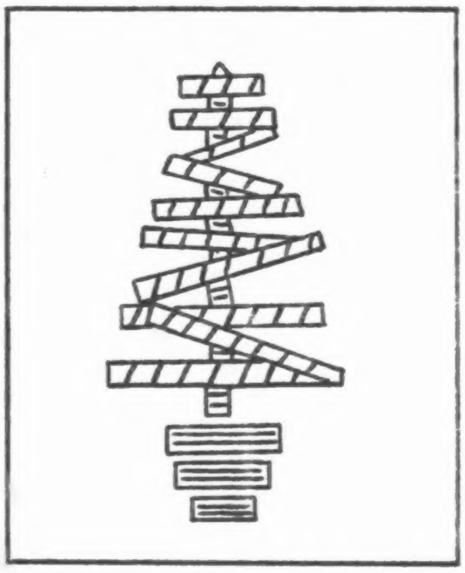
Many other types of creatures may be made in the same way but by using different sized heart shapes, e.g., birds, insects.





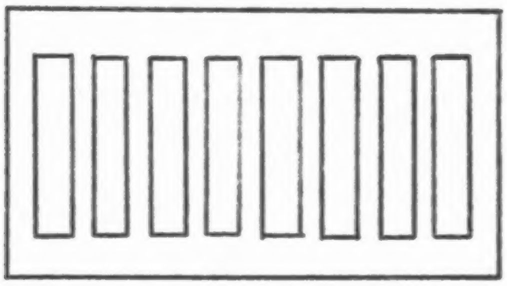
C. PAPER CUTTING

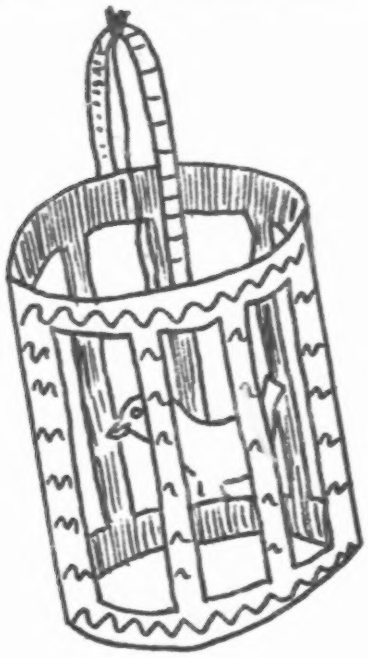
1. Tape Tree



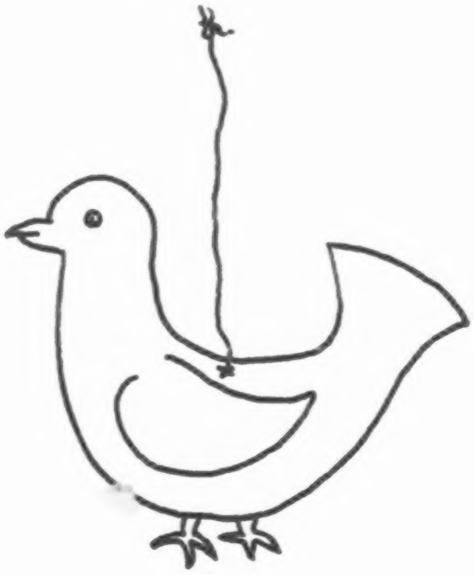
Using strips of paper of varying lengths, paste on to a sheet of construction paper to form a tree.

2. Bird in a Cage

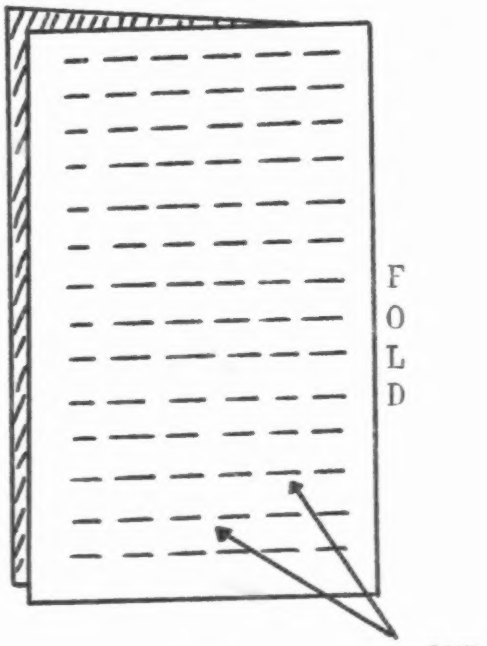


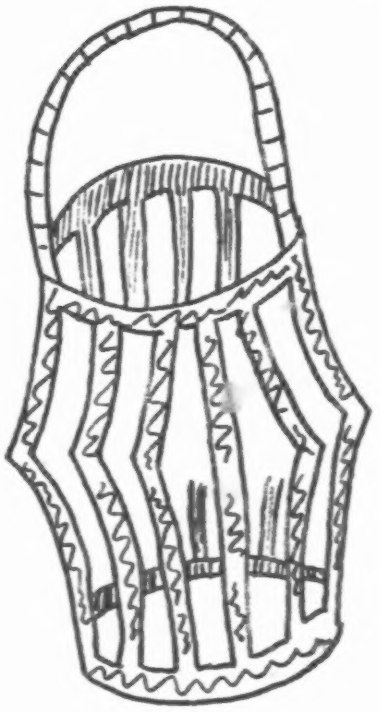


Rectangle of construction paper. Cut $\frac{1}{2}$-inch strip off one for handle. Cut out shaded areas. Decorate. Paste one end all along the edge. Join up the other to make a cylinder. Paste handle in position. Cut out bird shape. Decorate. Attach string to bird and fasten to handle.



3. Lanterns





Decorate a rectangle of construction paper with paints.

Fold in half lengthwise with pattern on the outside.

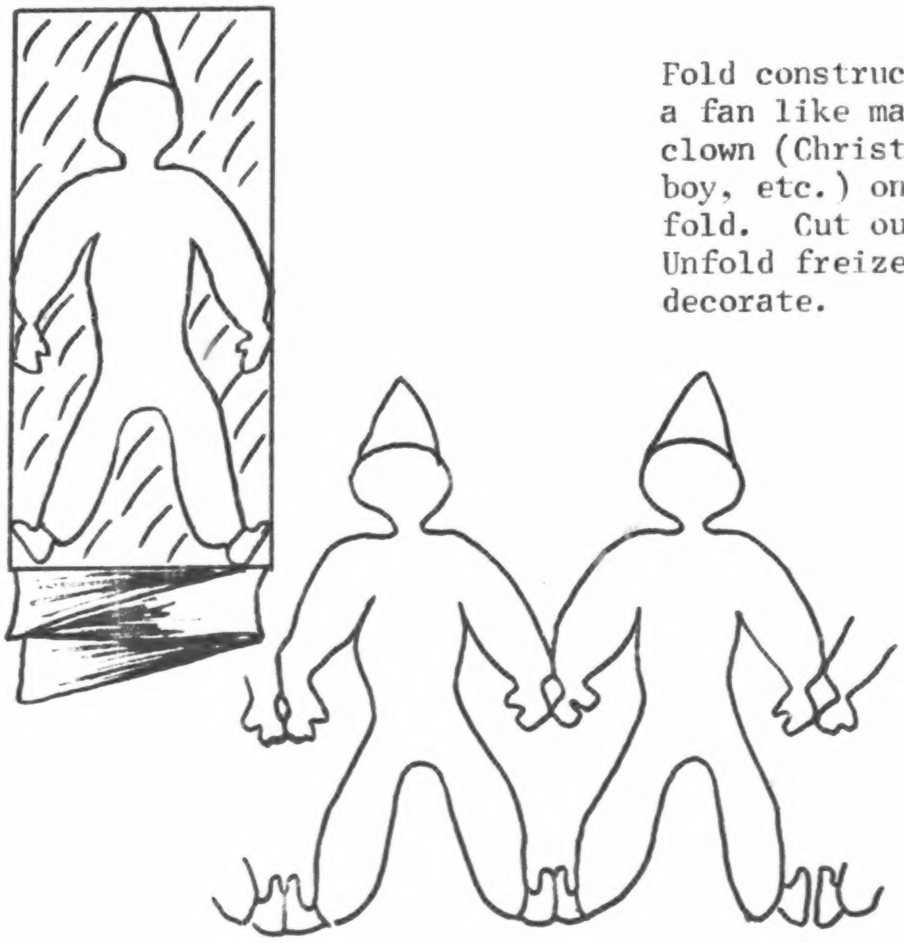
Cut off $\frac{1}{2}''$ strip from short side for handle.

Make half inch cuts along folded edge up to one inch of unfolded edge.

Open out sheet, bring narrow sides together and paste.

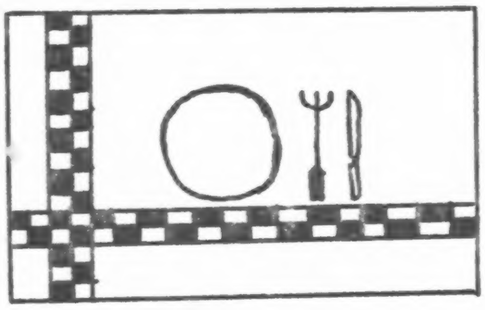
Attach handle.

4. Paper Freizes



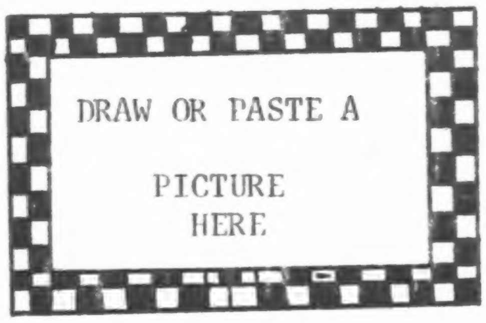
Fold construction paper in a fan like manner. Draw clown (Christmas tree, cowboy, etc.) on the front fold. Cut out shaded areas. Unfold freize of clown and decorate.

5. Table Mats

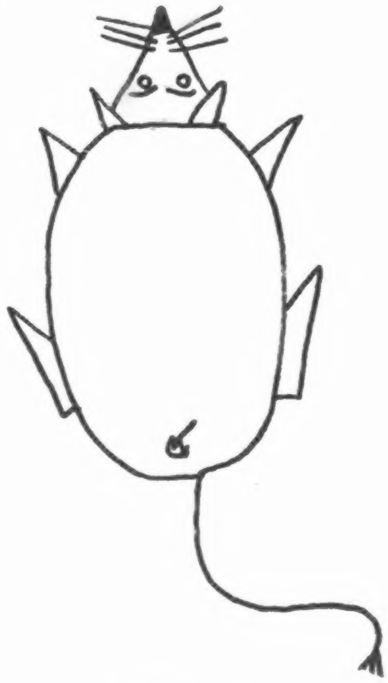


Color strips of squared paper with different colors, 2 or 3 strips per child only.

Arrange on sheet of construction paper making a table mat or picture frame.

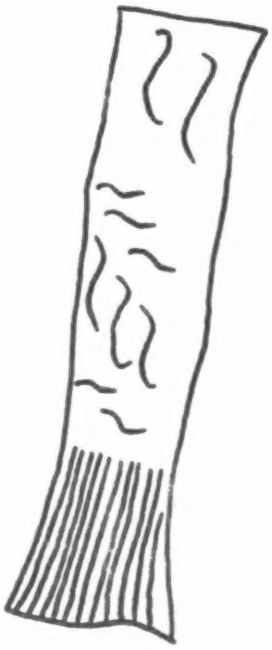


6. Book Markers



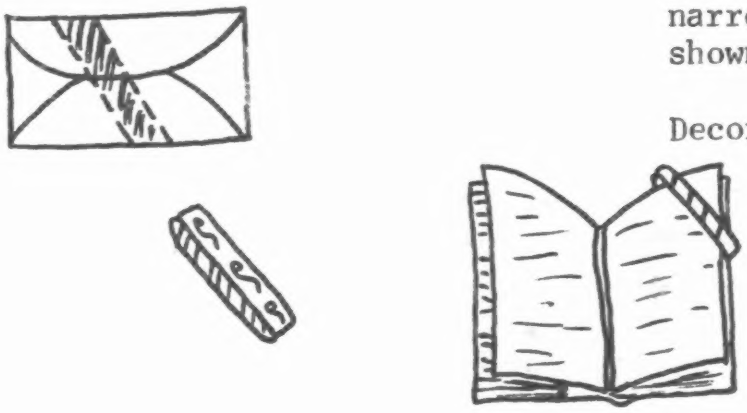
Draw a simple mouse shape on construction paper.

Cut out shape and decorate. Paste on string for tail.



Using long strips of construction paper, decorate with paints or crayons.

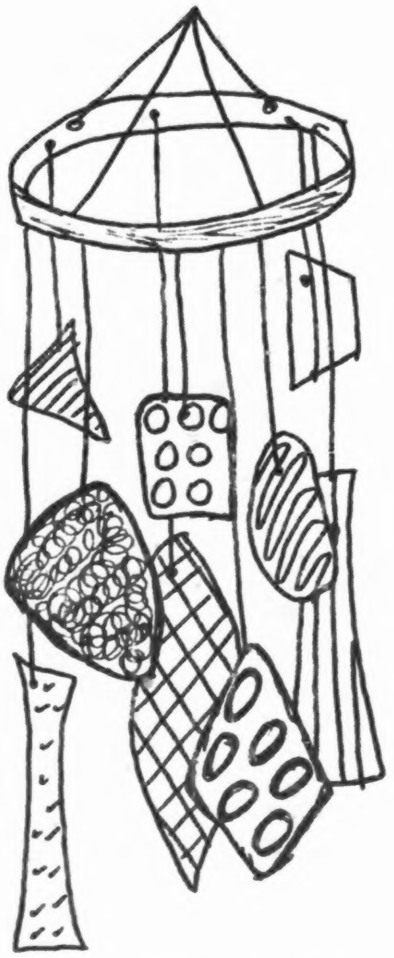
Cut fringe at one end.



Using envelopes that have been opened at narrow end, cut as shown in the diagram.

Decorate.

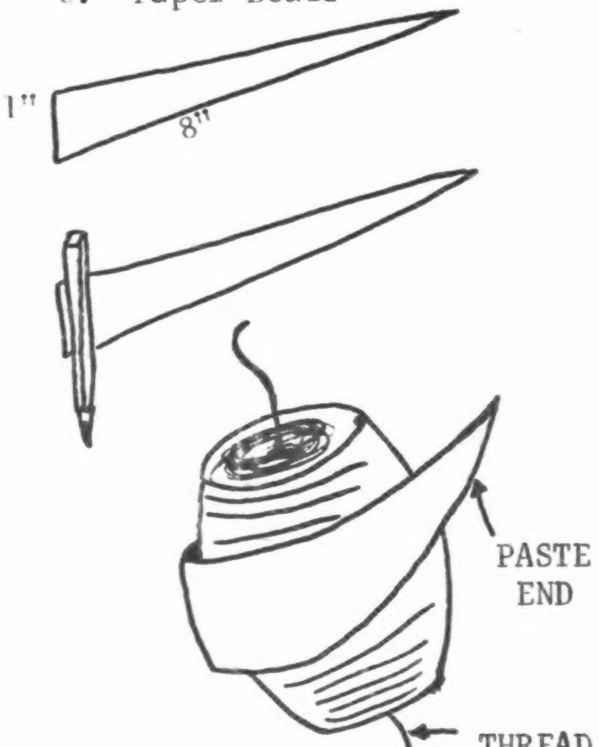
7. Mobil Space Design



Materials: Cardboard, string, paint or crayons, construction paper.

Method: Cut a strip of cardboard four-inches wide by twenty-four-inches long. Make four holes at the top of the cardboard and around eight or ten holes at regular intervals along the bottom. Glue the ends together to make a circle. Cut out different shapes of construction paper and decorate each one differently. Make a small hole in each and attach a length of string or yarn. Attach the shapes to the ring. Fasten four lengths of string to the top of the circle to hang up. These designs may be replaced by animals or birds, etc.

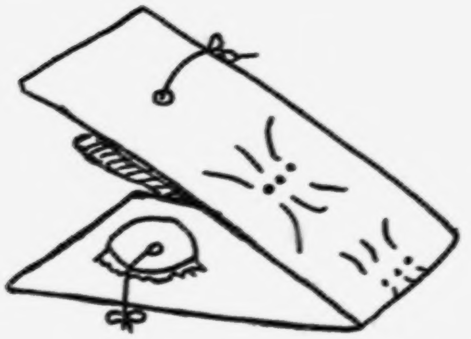
8. Paper Beads



Cut paper into long strips. (Vary size to vary size of beads.) Place pencil or stick at wide end of paper and roll up. Paste end of paper. Remove pencil. Paint and varnish if possible. String on to thread.

D. CONSTRUCTION WORK

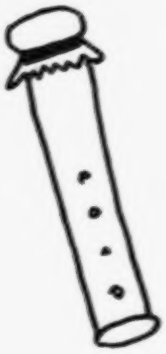
1. Pop Top Castanets



Materials: Strip of heavy cardboard about six inches long; thin yarn or string; two bottle caps.

Method: Make a small hole in each bottle cap--a nail and a hammer should do the job. Make a similar hole one inch from each end of the cardboard. Place each bottle cap face down over a cardboard hole. Push string through the hole, draw the ends of each string together and knot them so that the bottle top is attached tightly.

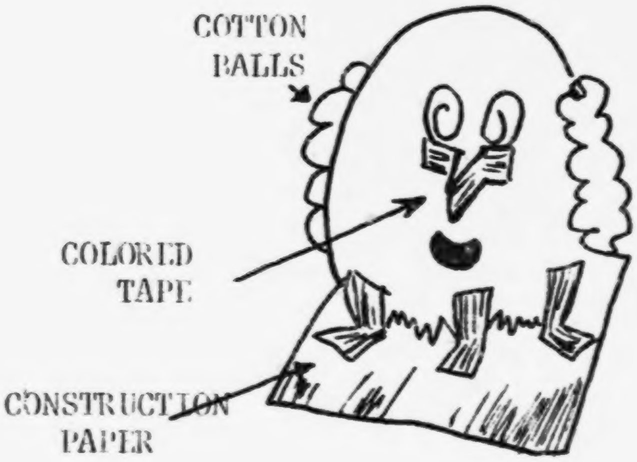
2. Humboard Kazoo



Materials: Cardboard tube any length; wax paper; scotch tape or an elastic band, nail, crayons or paints.

Method: Cover the end of a cardboard tube with the waxed paper and secure firmly with elastic band or scotch tape. Use the nail to punch eight small holes at an even distance apart from one another in a straight line along the center of the tube. Decorate the tube with paints or crayons or paste on aluminum foil.

3. Eggshell Creatures

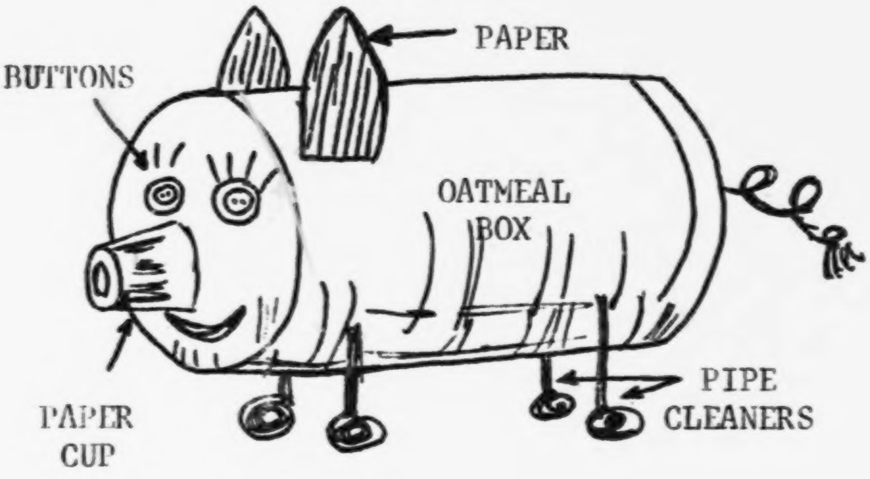

COTTON BALLS
COLORED TAPE
CONSTRUCTION PAPER

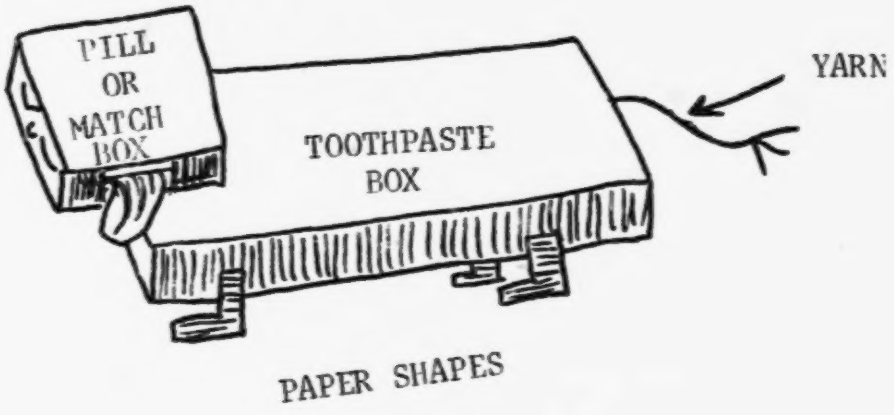
Use empty eggshells, colored sticky tape, and scraps of material, e.g., feathers, yarn, cotton balls. Color shells by dipping into food coloring and water, or paint with poster paints.

Use tape to attach shell to a cardboard base -- or --

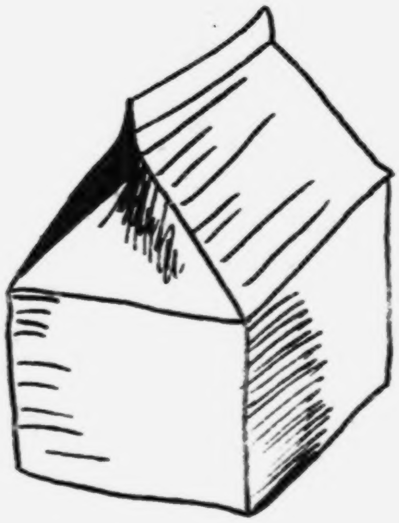
Thread yard through the top to hang up.

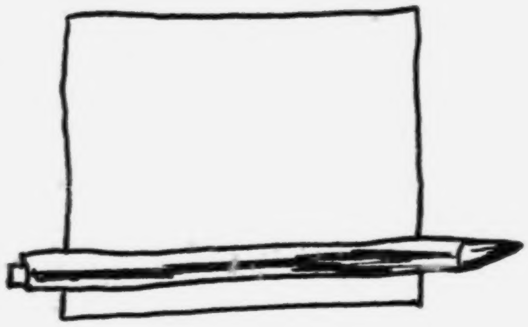
4. Animals Using Boxes

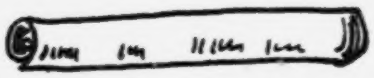

PAPER
BUTTONS
OATMEAL BOX
PAPER CUP
PIPE CLEANERS

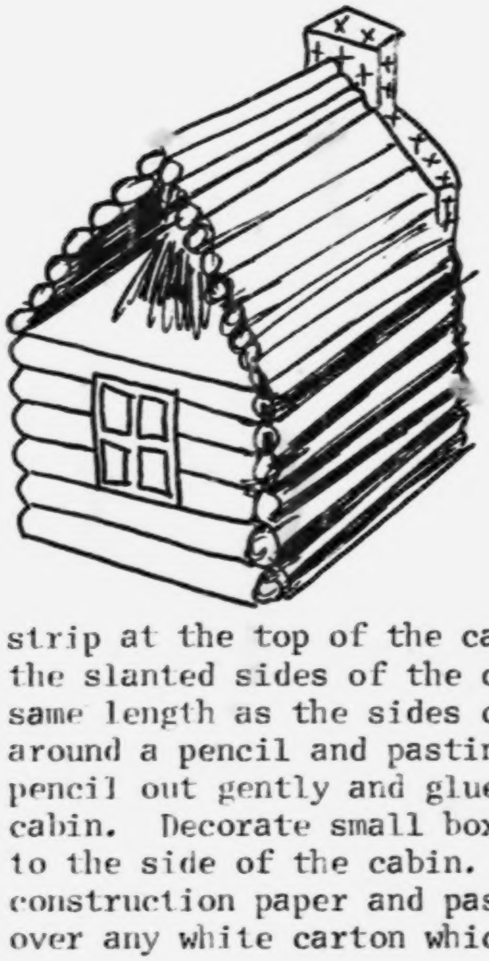

PILL OR MATCH BOX
TOOTHPASTE BOX
YARN
PAPER SHAPES

5. Lincoln's Log Cabin







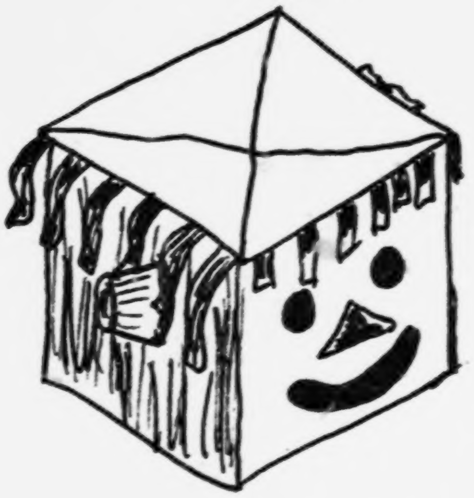


Materials: Small boxes, milk carton, construction paper, pencil.

Method: Use a pint-size carton or cut the top from a quart carton. Paste a piece of paper to straight strip at the top of the carton and paste sides of paper to the slanted sides of the carton. Form strips of paper (the same length as the sides of the carton) into logs by rolling around a pencil and pasting down its outer edge. Slide the pencil out gently and glue the logs to the sides of the cabin. Decorate small boxes to look like a chimney and add to the side of the cabin. Make windows and a door from construction paper and paste in position. Use paint to color over any white carton which may show through.

6. Paper Bags and Boxes

a. Masks



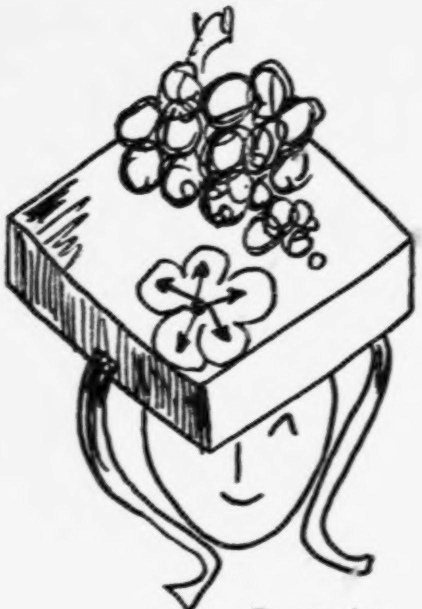
Cut out holes for eyes, nose, and mouth.

Decorate with paints and crayons.

Yarn may be glued on for hair.

Paper cups may be glued on for ears.

b. Hats

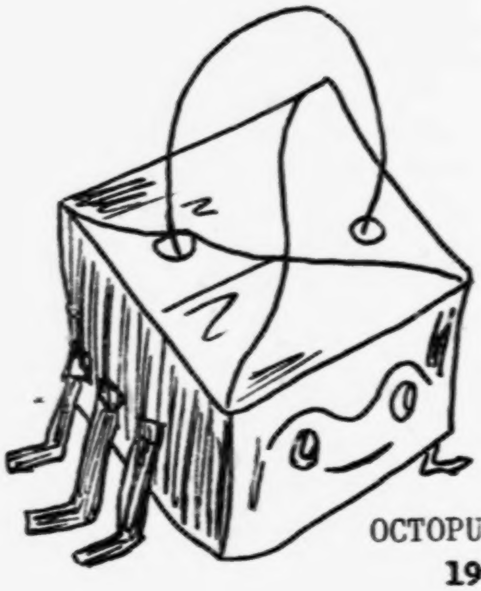


Attach string or ribbon for ties.

Decorate.

Paper shapes may be added for ear flaps or peaks.

c. Puppets



OCTOPUS

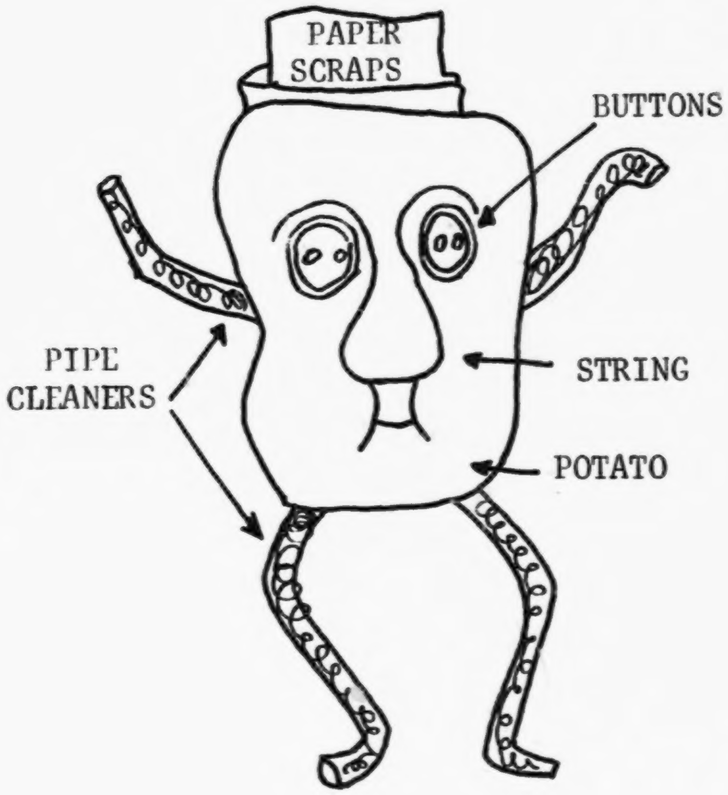
Thread string through the top and make a loop.

Paste on long strip of paper for legs.

Decorate face.

7. Animals Using Vegetables

a. Humpty Dumpty


PAPER SCRAPS
BUTTONS
PIPE CLEANERS
STRING
POTATO

Clean potatoes, carrots, or other root vegetables.

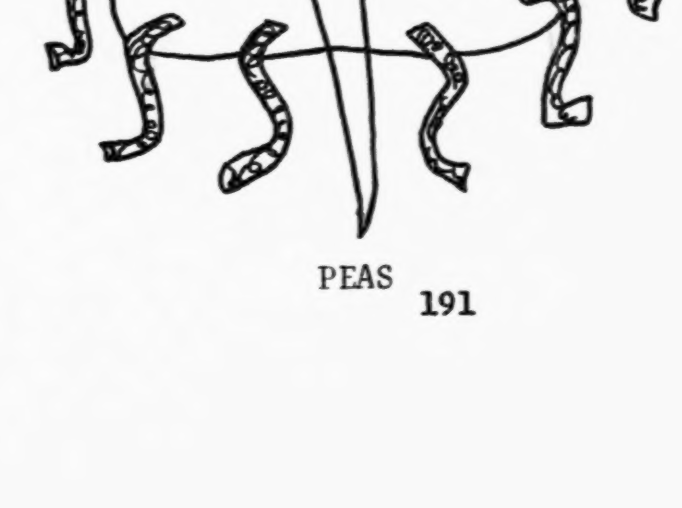
Use toothpicks or pipe cleaners for legs.

Yarn or string for tails.

Buttons may be attached with pins and serve as eyes.

Have paper shapes available for clothes.

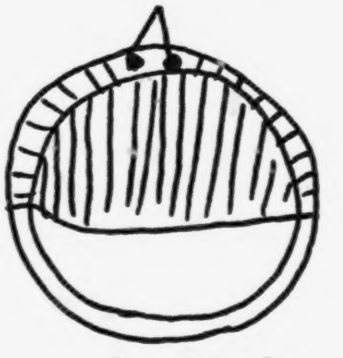
b. Spider


TOOTHPICKS
PEAS

The head is a small piece of potato attached by a toothpick

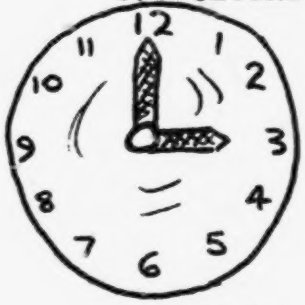
8. Work with Paper Plates

a. Wall Pockets



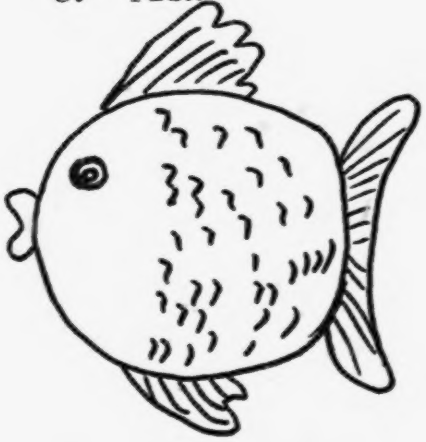
One and a half ($1\frac{1}{2}$) paper plates per child. Paste edges of half plate to whole plate front sides together as shown. Knot string and thread through top of whole plate. Decorate. Use to keep letters and pencils in.

b. Clocks



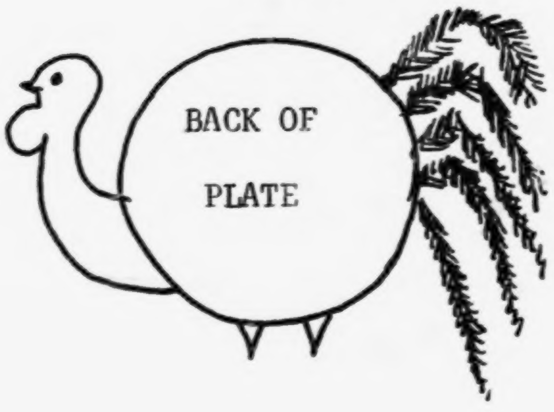
Cut fingers from construction paper. Fasten with paper fastener. Mark in numerals. Decorate.

c. Fish



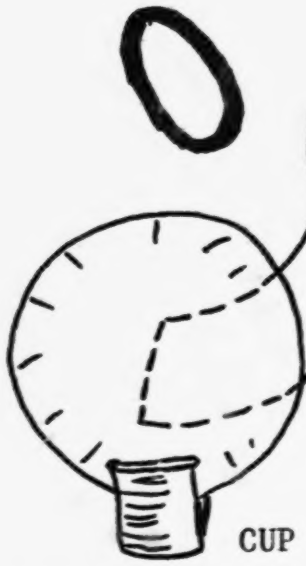
To front side of plate paste in fins, mouth and tail and cut from construction paper. Paste another plate over the top--face to face.

d. Thanksgiving Turkey



To front side of plate, paste in head, tail, and legs. Paste another plate over the top--face to face. Decorate. Use toothpicks or straws for legs, feathers, or scraps for tail and construction paper for head.

e. Turtle Hoopla



Cut out head shape and decorate.

Paste in position on front side of plate.

Paste 2nd plate in position, fronts together (as for fish).

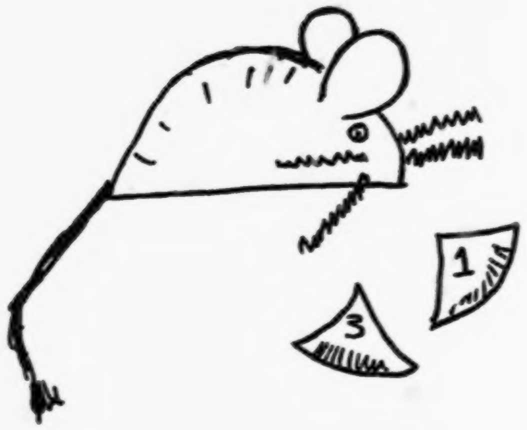
Decorate plates.

Cut 2 wedges out of a paper cup.

Insert plates in cup.

Make paper circles and throw over head.

f. Mouse Game



Cut plate into half.

Paste rounded edges together.

Thread string or pipe cleaners through for whiskers.

Paste on 2 ear shapes and tail.

Decorate. Cut 2nd plate into sections, paint on numbers.

Play--who can throw sections nearest to mouse.

ERIC REPORT RESUME

DEPARTMENT OF HEALTH EDUCATION AND WELFARE
OFFICE OF EDUCATION

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THE EFFECTS OF INDIVIDUALIZED VERSUS GROUP ORIENTED PHYSICAL EDUCATION PROGRAMS ON SELECTED PARAMETERS OF DEVELOPMENT OF EDUCABLE MENTALLY RETARDED AND MINIMALLY BRAIN INJURED CHILDREN

G. LAWRENCE RARICK AND GEOFFREY D. BROADHEAD

UNIVERSITY OF WISCONSIN, MADISON, WISCONSIN

Account number 144-8144

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194p.

Physical Education: Educable Mentally Retarded: Minimally Brain Injured: Child Development: Elementary School Children: Special Education: Disability: Multivariate Analysis

This investigation examined the role of physical activity programs in the modification of the motor, intellectual, social, and emotional development of educable mentally retarded children and minimally brain injured children. Forty nine classes of children (275 EMR and 206 MBI) participated in 20 weeks of instructional programs. Classes were randomly assigned to one of four treatments: two were physical education programs, (one individually oriented, the other group oriented); one was an art program (Hawthorne effect); the fourth, a control (usual program). A battery of 32 tests was administered prior to and at the end of the experiment. The data were treated by multivariate analyais of covariance. The results showed that children in the special experimental programs elicited greater positive changes in their motor, intellectual, and emotional behavior than those in the control program. Of the special programs, the physical education programs were superior in modifying motor performance, the art program in altering emotional behavior, and neither was superior in modifying intellectual behavior. The individually oriented physical education program elicited greater gains than the group oriented program in measures of motor, intellectual, and emotional behavior. Positive behavior changes occurred more frequently in the older than younger, more often in the brain injured than the retarded, and more frequently in the boys than the girls.

ACKNOWLEDGEMENTS

Thought to be the most comprehensive examination of the role of educational physical activity programs for special education children, this research involved 481 educable mentally retarded children, and minimally brain injured children in three school districts in Harris County, Texas. These children are sincerely thanked for their part in this investigation.

In the three school districts support, enthusiasm, and cooperation were given by the Directors of the Special Services Departments; Mrs. Tommye D. Frye in Pasedena, Mrs, Margaret Bigham in Deer Park, and Mr. Stuart B. McKenty in Galena Park. The communication of this support led to further considerations being afforded by the Principals of the fifteen schools regarding scheduling and other matters of importance. The Directors of Physical Education and Athletics, Mr. W. Phillips, Mr. J. Keethan, and Mr. Paul Smith helped in numerous ways. Much assistance was also given by Mrs. Elizabeth Sterrett and Mr. B. Creath, and by the secretaries in each district office.

Special gratitude is experessed to each of the 49 teachers, who whole-heartedly cooperated in a most friendly and unselfish way; their valued time and effort were appreciated.

Directing and supporting these people were the School Superintendents, Mr. W. C. Cunningham in Galena Park, Mr. George Thompson in Pasadena, and Mr. C. Abshier in Deer Park. Their cooperation in allowing entry to the schools, and in eliciting the help of many persons is most gratefully acknowledged.

At the University of Wisconsin Miss JoAnn Mortenson is thanked for preparing the graphic material, and Mrs. Ruth Mowitz and Miss Linda Horne are thanked for typing the manuscript.

G.L.R.
G.D.B.